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ABSTRACT

A study was conducted to derive an Occupation Analysis Inventory (OAI) based hierarchical occupational cluster structure which could provide the framework and content for developing an information system applicable to occupational exploration and guidance. (The OAI is an instrument containing 622 work elements which are descriptions of work activities and conditions on which jobs and occupations are rated.) A sample of 1,414 jobs was profiled on 102 selected OAI first-order work dimensions and a pairwise job similarity matrix was computed. A hierarchical cluster analysis produced twenty-one macro clusters which subsumed eighty-eight micro clusters. Subsequent modifications of the structure expanded the major clusters to twenty-five and reduced the micro clusters to forty-seven. Statistical analyses of the macro clusters showed moderate to substantial within-cluster homogeneity, intercluster discriminability, and cluster stability. (In addition to some data analysis tables, the appendix includes a description of an envisioned OAI-based information system, profile variables for 1,414 jobs, homogeneity index to identify clusters, the jobs and work-dimensions profiles of the macro clusters, macro cluster profiles on 102 attributes, jobs within the micro clusters, and relationships among products and work units in an individualized vocational information system.) (Author/EM)

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OCCUPATIONAL CLUSTERS BASED ON SYSTEMATICALLY DERIVED WORK DIMENSIONS: FINAL REPORT

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J. W. Cunningham

Department of Psychology

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Report No. 16 of the Ergometric Research and Development Series

Program Director: J. W. Cunningham

CENTER FOR OCCUPATIONAL EDUCATION
North Carolina State University at Raleigh

1977

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J. W. Cunningham, Program Director

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(2) There is an established technology, "ergometrics" (or quantitative activity analysis), that can be used in gathering and organizing information about the domain of adult activities for educational development purposes.

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ABSTRACT

Occupational clusters were derived from work-dimension profiles of jobs. In previous research, a sample of 1414 jobs representing the U. S. work structure was rated on the Occupation Analysis Inventory (OAI), a comprehensive instrument containing 622 "work elements" describing various kinds of work activities and conditions. Several factor analyses of those job ratings reduced the 622 OAI work elements to 132 first-order and 28 higher-order factors, or "work dimensions." In the study reported here, the 1414 jobs were profiled on 102 selected OAI first-order factors, and a pairwise job similarity matrix was computed containing the intercorrelations among the factor-score profiles. (Preliminary research showed the Pearsonian correlation to be superior for this particular purpose to several other profile similarity indices.) A hierarchical cluster analysis of the job intercorrelations produced 21 broad "macro" clusters which, in turn, subsumed 88 narrower "micro" clusters. However, one particularly inclusive macro cluster was subsequently broken down into five components, thus expanding the number of major clusters to 25. Another modification of the cluster structure combined certain judgmentally related micro clusters, condensing the original 88 micro clusters to 47 titled categories. Statistical analyses of the macro clusters showed moderate to substantial within-cluster homogeneity, inter-cluster discriminability, and cluster stability. In addition, the macro-cluster structure was judged to be meaningful and comprehensive in relation to the Worker Traits Arrangement in the Dictionary of Occupational Titles. With further development the OAI cluster structure might provide a suitable framework for occupational exploration and guidance. (A brief description of an envisioned OAI-based information system for use in occupational exploration and guidance is appended.) Future OAI research and development possibilities are discussed. It is opined that occupational systematics has much to contribute in the areas of occupational education and guidance.

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INTRODUCTION

This report is part of the Ergometric Series dealing with the development of a quantitative system for describing and structuring the world of work for educational and guidance purposes.

In earlier papers (Cunningham, 1974a; Cunningham, Tuttle, Floyd, and Bates, 1974), it was proposed that systematically derived dimensions representing various types of human work activities could serve at least two purposes:

(1) Such dimensions could provide a quantitative basis for the description, comparison, and classification of jobs and occupations.

(2) They could serve as variables for the measurement of work-related behavioral potentials (e.g., abilities and interests) of people.

Pursuant to those intents, the staff of the Ergometric Project at North Carolina State University's Center for Occupational Education have been engaged in a research effort involving the derivation and validation of a comprehensive set of human work dimensions based on the Occupation Analysis Inventory, or OAI (Cunningham et al., 1974). Thus far, the resultant work dimensions have been applied on an exploratory basis in two areas related to the aforementioned purposes: systematic job clustering and the development of activity preference (interest) scales.

The present study involved an attempt to derive a comprehensive occupational cluster structure based on the OAI work dimensions.

Background of the Study

The Ergometric Project began with the development of an Occupation Analysis Inventory (OAI) containing 622 "work elements" (descriptions of different kinds of work activities and conditions) on which jobs and occupations are rated (Cunningham et al., 1974). The OAI work elements were generated within the broad framework of an information-processing paradigm (see Figure 1) whose components were subdivided according to selected conceptual frameworks pertaining to human behavior and work technology; the work elements were constructed within the resultant subcategories. The completed instrument represented an attempt to achieve as much specificity (or content loading) in occupational description as possible, while retaining applicability to the entire occupational spectrum. The OAI was thus conceived as ". . . an instrument which pushes the limits of general applicability; that is, an instrument that falls near a specificity-generality threshold separating general descriptive devices from devices designed for restricted categories of jobs and occupations" (Cunningham et al., 1974, p. 5).

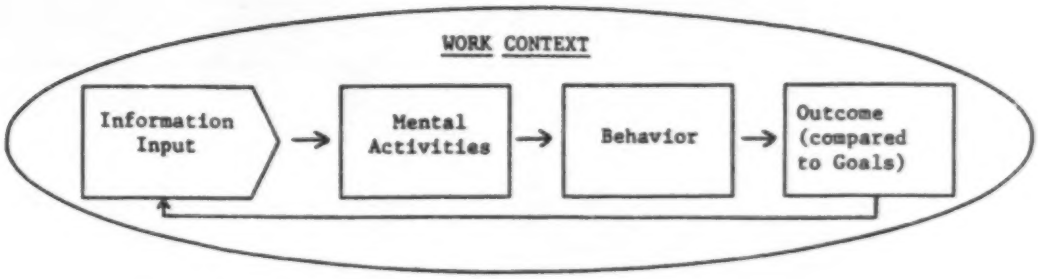

Figure 1. Paradigm of the Occupation Analysis Inventory (OAI)

The next phase of the Ergometric Project involved rating large, representative samples of jobs on the OAI. In a series of three studies (Riccobono and Cunningham, 1974a, 1974b; Boese and Cunningham, 1976), a total of 1414 jobs were rated on the OAI by professional job analysts and graduate students in psychology using written job descriptions (USES job schedules) obtained from the files of the U. S. Employment Service's Occupational Field Center located in Raleigh, North Carolina. In the last of the three studies, eight separate a priori sections of OAI work elements were each subjected to a factor analysis based on the 1414 job ratings. Those eight separate analyses produced a total of 132 first-order factors, or work dimensions, representing basic types of work activities or conditions within their respective OAI sections. For the purpose of combining all sections of OAI elements, 128 of the first-order factors were, in turn, subjected to a factor analysis which yielded 28 orthogonal higher-order factors. In general, both the first- and higher-order factors were meaningful and stable as determined by Tucker's coefficient of congruence.

Since the OAI was designed to analyze and describe jobs in terms relevant to human behavior, it was also considered desirable and feasible (in terms of existing technology) to link the OAI work elements to defined human attributes in the cognitive, psychomotor, and affective domains (i.e., to selected abilities, interests, and needs). Accordingly, the investigators identified and defined 103 human attributes for which there were existing tests or inventories in the three domains. Estimated requirements were then established for each OAI work element on each of the 103 human attributes, according to the job-component (or synthetic validity) procedure developed by E. J. McCormick at Purdue University (McCormick, Cunningham, and Thornton, 1967; McCormick, Jeanneret, and Mecham, 1972; Pass and Cunningham, 1975; Neeb, Cunningham, and Pass, 1974). The derived linkages between the OAI work elements and the 103 measurable human attributes expanded the capacity of the OAI; based on those linkages, the OAI could provide estimates of a job's requirements for the various human attributes, as well as a description of the activities and conditions (in terms of work elements and dimensions) involved

in the job. It is believed that the OAI-based attribute-requirement profiles for jobs and occupations could prove useful in the vocational guidance setting as a means of relating a student's measured abilities, interests, and needs to the characteristics of jobs, occupations, and occupational clusters.

During the course of the Ergometric Project, four studies have been conducted to test the construct validity of the two sets of variables derived from the OAI, i.e., the work dimensions (factors) and attribute-requirement estimates (Augustin, Cunningham, and Heath, 1975; Bates and Cunningham, in press; Heath, Cunningham, and Augustin, 1975; Tuttle and Cunningham, 1974). In those studies, it was reasoned that if the OAI variables were actually relevant to work-related human behavior then it should be possible to demonstrate statistically significant relationships between those variables and the behavioral potentials measured by selected tests and inventories. In combination, the four studies have, in fact, shown significant relationships between (a) the OAI work-dimension scores and attribute-requirement estimates for several samples of occupations and (b) the ability, interest, need, and satisfaction scores of incumbents or graduate trainees in those same occupations. Based on the research conducted to date, it seems reasonable to conclude that the OAI variables are meaningful, reliable, construct valid (within the limits of the aforementioned studies), and potentially useful in educational development.

Purpose of the Study

One of the major reasons for the development of the OAI and the derivation of the aforementioned occupational variables was to provide a systematic, quantitative basis for describing, comparing, and grouping jobs and occupations for educational purposes. In that regard, it was noted that although some other fields (most notably biology) have devoted considerable time and effort to taxonomic problems, the area of work and occupational taxonomy is relatively undeveloped, especially in relation to educational needs (Cunningham, 1974a). Thus, it was proposed that the OAI work dimensions be used to derive an occupational cluster structure that might provide at least a crude framework for occupational guidance, exploration, and other educationally related needs (e.g., general occupational capabilities curricula).[1]

Pursuant to that goal, Riccobono, Cunningham, and Boese (1975) conducted an exploratory study in which hierarchical cluster analysis was applied to 814 jobs based on similarities in their factor-score profiles on 22 OAI higher-order work dimensions. From that analysis, 73

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[1]At the same time, it was noted that the development of a comprehensive, detailed taxonomic system for work and occupations would require the efforts of many researchers over a period of years.

occupational clusters were identified and interpreted. Although those clusters were for the most part individually meaningful, the desired hierarchical pattern of clustering--i.e., broad, general occupational clusters subsuming clusters that are narrower in scope--did not emerge in an interpretable form, and 155 of the 814 jobs in the sample failed to cluster in a logical manner at any stage of the hierarchical process. The investigators identified some factors that might have diminished the clarity of the hierarchical cluster structure and proposed that appropriate adjustments be made in a subsequent study. The nature of those adjustments is described in the Procedures and Results section of this report.

The study reported here was a sequel to the job-cluster study conducted by Riccobono et al. Its purpose was to derive an OAI-based hierarchical occupational cluster structure which, with future refinement, might provide a suitable framework and some of the content for the development of an information system applicable to occupational exploration and guidance.

The specific objectives of the study were as follows:

(1) To derive and interpret a comprehensive set of broad, "macro," occupational clusters which, in turn, would subsume a larger number of narrower, "micro," clusters;

(2) To derive and label the micro-level occupational clusters;

(3) To derive average OAI work-dimension and attribute-requirement profiles for each of the macro-level occupational clusters; and

(4) To determine the homogeneity, stability, and discriminability of the macro-level occupational clusters.

PROCEDURES AND RESULTS

Preliminary Research

In discussing the results of their exploratory occupational cluster analysis, Riccobono et al. (1975) speculated that the clarity of the resultant cluster structure may have been diminished by two correctable factors: (a) the type of profiles similarity index used and (b) the nature of the profile variables. Accordingly, it was decided that preparatory to any further occupational cluster analyses, a preliminary study would be conducted involving comparative analyses of different profile similarity indices and different methods of estimating scores on the OAI work dimensions (factors) used as profile variables.

In connection with the first potentially correctable factor (the profile similarity index), it was suspected that the OAI work-dimension (or factors) scores for jobs were influenced by the adaptation levels of the raters. Thus, raters could differ appreciably in their average OAI work-element ratings of the same jobs, and this, in turn, would introduce consistent inter-rater differences into the OAI work-dimension (factor) scores for those jobs. Such inter-rater differences would be confounded with "true" differences among jobs on the OAI work dimensions, since a large number of raters were involved in the OAI analyses of the 1414 jobs and each job was, in most instances, analyzed by only one rater. If the rater adaptation-level effect does, in fact, enter heavily into the differences in work-dimension scores among jobs, it would seem advisable to use a profile similarity index that accounts for profile shape but does not reflect profile elevation. The preliminary study was designed, in part, to determine if similarity indices that relate profiles based primarily upon their shape (e.g., the Pearson coefficient and cosine) would produce more meaningful occupational clusters from the OAI work-dimension profiles of jobs than would similarity indices that depend upon profile elevation (i.e., the various distance measures).

In regard to the second potentially correctable factor (the profile variables), it was speculated that an "incomplete" method of estimating the OAI work-dimension (factor) scores for jobs might result in a more meaningful occupational cluster structure than a "complete" method of factor-score estimation. In the present study, the complete and incomplete methods of factor-score estimation are distinguished by whether they use all of the variables from a factor analysis (the complete method) or only a limited number of important, or salient, variables marking each factor (the incomplete method) (Horn, 1965). It was reasoned that since the OAI factors were interpreted based on work elements marking the factors with substantial loadings, it might be desirable to include only those salient work elements in estimating the

factor scores for jobs. To use all of the work elements from a factor analysis in factor-score computation could result in non-zero factor scores for some jobs which would not be meaningful in terms of a factor's interpretation; i.e., a job could obtain a non-zero factor score from ratings on OAI work elements that were not considered in the factor's interpretation. Based on the foregoing rationale, it was decided that three different factor-score estimation procedures (one complete and two incomplete) would be compared in the preliminary study.

The procedures and results of the preliminary study are described in detail in Appendix A. Essentially, the study involved (a) using alternative profile similarity indices and factor-score estimation procedures in clustering a selected sample of jobs based on their OAI factor-score profiles, and (b) relating the results obtained with the various alternatives to a criterion job-similarity matrix and a criterion cluster structure. In addition, jobs were rank-ordered in terms of their scores on selected OAI factors as derived by the three alternative estimation procedures, and the alternative job rankings were examined for consistency with the investigators' interpretation of the factor in question. The results of the preliminary study showed the similarity indices dependent primarily upon profile shape (i.e., the Pearson coefficient, cosine, and percent overlap) to be clearly superior to the indices that depend heavily upon profile elevation (i.e., several distance indices). On the other hand, the three factor-score estimation procedures performed equally well in relation to the job-similarity criterion matrix and the criterion cluster structure, though scores based on the two incomplete methods seemed more consistent with the factor interpretations than scores based on the complete method; i.e., more jobs for which the investigators judged a factor to be irrelevant received zero scores with the incomplete methods. Based both on the results of the preliminary study and certain practical considerations, it was decided that the Pearson correlation coefficient and one of the incomplete factor-score estimation procedures (i.e., the mean rating on the salient work elements in an OAI factor) should be used in a subsequent effort to derive an OAI-based occupational cluster structure. (See Appendix A for a detailed description of the preliminary study.)

The remainder of this report describes an effort to derive a meaningful occupational cluster structure based on the OAI work-dimension (factor) score profiles of a large, representative sample of jobs.

The Job Sample

The present study employed a total sample of 1414 jobs consisting of a combination of three smaller job samples drawn in earlier studies (Riccobono and Cunningham, 1974a, 1974b; Boese and Cunningham, 1975). This total sample contained jobs in proportion to the percentage of the U. S. working force employed in the following five major occupational categories: professional, technical, and managerial occupations; clerical and sales occupations; service occupations; farming, fishery, forestry, and related occupations; and operatives, skilled trades,

and related occupations. Table 1 presents the numbers and percentages of jobs representing each of those five occupational categories. The procedure for compiling the total sample is described in a previous report by Boese and Cunningham (1975).

The OAI ratings of jobs were based on written job descriptions ("job schedules") compiled by the U. S. Employment Services. The OAI rating procedure has been described in earlier reports (Riccobono and Cunningham, 1974a, 1974b). The ratings of the 1414 jobs on 622 OAI work elements provided the data from which the job profile variables (work dimensions) for the present study were derived (Boese and Cunningham, 1975).

Table 1

Numbers and Percentages of Jobs Drawn from Five Related Occupational Categories of the Dictionary of Occupational Titles and the U. S. Census (N = 1414)

Major Categories	Three-Digit DOT Code	Number in Sample	Percentage of the Sample	Percentage of U. S. Work Force
1. Professional, Technical, and Managerial Occupations	000-199	327	23.1	23.1
2. Clerical and Sales Occupations	200-299	355	25.1	25.1
3. Service Occupations	300-399	181	12.8	12.8
4. Farming, Fishery, Forestry, and Related Occupations	400-499	44	3.1	3.1
5. Operatives, Skilled Trades, and Related Occupations	500-999	507	35.9	35.9
TOTAL		1414		

The Profile Variables

As mentioned earlier, the 622 OAI work elements were reduced to 132 first-order factors, or work dimensions, through separate factor analyses of eight different sections of work elements (Boese and Cunningham, 1975). In the present study, a profile of factor scores was computed for each of the 1414 jobs on three different sets of factors; these three sets contained 38, 102, and 117 first-order factors, respectively. The titles of the factors contained in the three sets are listed in Appendix B, where it can be seen that the successively larger sets of factors subsumed the smaller sets; i.e., the larger sets contained all of the factors in the smaller sets, plus additional factors. The set of 38 OAI factors, or work dimensions, was selected from the factor solutions for the Information Received and Work Goals sections of the OAI. Those factors pertain to content areas of work such as mechanical, electrical, biological/health, and business/sales (Cunningham et al., 1974). The set of 102 factors consisted of all of the 132 first-order OAI factors that were judged to be meaningful, excluding those factors derived from the General Physical Requirements and Work Context sections of the OAI. The third set of factors contained the 102 work dimensions mentioned above plus selected factors from the OAI General Physical Requirements and Work Context sections.

The procedures for computing the factor scores for jobs are described in Appendix A. An incomplete method of factor-score estimation (Horn, 1965) involving the averaging of a job's ratings on the salient work elements was employed with the sets of 38 and 102 factors, while a complete method of factor-score computation (Dixon, 1970) was used with the set of 117 factors.

The Profile Similarity Measure

Based on the results of the preliminary research (Appendix A), the Pearson product-moment correlation coefficient was selected for use as the index of profile similarity in the cluster analysis of the 1414 jobs. The OAI factor-score profile of each job was correlated with the factor-score profile of each of the remaining jobs in the sample, to produce a 1414-by-1414 correlation matrix representing the pair-wise similarities among the jobs. A separate 1414-by-1414 correlation matrix was computed based on each of the three previously mentioned sets of factor-score profiles.

The Cluster Analysis Procedure

A hierarchical cluster analysis procedure, originally described by Ward (Ward, 1961; Ward and Hook, 1963), was applied to the aforementioned 1414-by-1414 correlation matrices. This hierarchical procedure is included in the CODAP[2]/Profile Analysis System developed by the U. S. Air Force HRL Personnel Research Division, Lackland Air Force Base, Texas, and modified for use on an IBM 360 computer system by Oats-Hill Consultants, Inc. (1970), under contract with the U. S. Navy. The modified CODAP software system was installed in an IBM 370/165 computer system by Oats-Hill under contract with the Center for Occupational Education, North Carolina State University. The cluster analyses reported in this study were carried out with the modified CODAP system on an IBM 370/165 computer.

The hierarchical cluster analysis procedure used in this study begins by treating each of the n jobs in the analysis as a separate "entity," or as a cluster containing only one member. The first step in the procedure involves the identification and merger of the two jobs with the highest profile similarity (correlation), thus reducing the number of entities to n-1; the merged jobs are treated as a single entity in the next step. In the second step of the procedure, the two most similar of the n-1 entities are located and merged, reducing the number of entities to n-2. In each subsequent step, the two entities whose profiles are most similar are merged, with the procedure continuing until all of the jobs are contained in one group (i.e., until the number of entities equals one). At each step, profile similarities are computed between the newly formed group and each of the other separate entities (clusters and/or individual jobs) at that particular level in the hierarchical solution. A similarity index between two job clusters is based on the average profile similarity between each job in one cluster and every job in the other cluster, i.e., the average pair-wise similarity between jobs across the two clusters.

A more complete description of the hierarchical clustering procedure has been presented in a previous report (Riccobono et al., 1975).

Derivation of the Occupational Cluster Structure

As indicated previously, the derivation and interpretation of two levels of occupational clusters were planned: a level, or set, of broad "macro" clusters which, in turn, would subsume a second level of narrower "micro" clusters. It was decided that in order to increase

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[2]Comprehensive set of Occupational Data Analysis Programs.

the likelihood of obtaining a meaningful cluster structure, a hierarchical cluster analysis would be carried out separately with three different sets of profile variables (see p. 8) and the three resultant cluster solutions would be compared.

The initial interpretation of each separate cluster solution involved the identification of a comprehensive set of macro clusters within the hierarchical solution, i.e., the determination of the point at which the merging process should stop for each of a comprehensive set of broad occupational groups. The investigators judged when the merging should stop for a particular cluster based on two criteria: (a) the "face validity" of a cluster in terms of the titles, DOT code numbers, and USES descriptions of its constituent jobs; and (b) the cluster homogeneity index provided in the output of the hierarchical cluster program. (Appendix C contains the formula for that index.) Thus, various macro clusters were selected from different stages in each hierarchical solution.

The comparisons among the three different cluster solutions were also judgmental in nature. The three solutions were compared in terms of the meaningfulness and comprehensiveness of their macro clusters and in terms of the meaningfulness of the overall hierarchical structure; i.e., whether seemingly related clusters of jobs merged to form larger, relatively homogeneous clusters before merging with apparently unrelated jobs and clusters. Based on the above judgmental criteria, it was determined that the cluster analysis employing the 102 first-order factor scores as profile variables (see The Profile Variables, p.8) produced the most meaningful solution. Table 2 lists the titles of the 102 first-order factors employed in that analysis. The 21 macro clusters identified in the selected solution are described in the following section. These clusters accounted for 1269 jobs out of the total sample of 1414.

From the selected cluster solution, 88 micro or sub-clusters were identified at stages preceding the 21 macro clusters in the hierarchical structure; that is, micro clusters were identified that were more specific than and subsumed by the macro clusters. The criteria for selecting the micro clusters were essentially the same as those described previously for the macro clusters. The identified micro clusters are described in a later section.

Table 2

Titles of the 102 OAI First-Order Work Dimensions (Factors) Used as Profile Variables in the Cluster Analysis of 1414 Jobs

Factor Number	Factor Titles Presented Under OAI Section Titles
	Information Received
1	Electrical and electronic information
2	Business-related numerical information
3	Health and biological information
4	Environmental information
5	Information related to visual aesthetics
6	Information from machines
7	Materials information
8	Spatial/structural/mechanical information
9	Information related to people and human behavior
10	Performing arts information
11	Structure and format of written information
12	Information related to animals
[a]13	Abstract mechanical information
[a]14	Direct structural/mechanical information
15	Food information
16	Indirect environmental information
17	Direct business/sales information
18	Physical science and technology information
19	Direct-contact information pertaining to the appearance, poise, and physical capabilities of people
20	Difficulty of numerical information
	Mental Activities
21	Semantic thinking
22	Figural information processing
23	Numerical and symbolic thinking
24	Routine symbolic and semantic information processing: clerical activities
25	Aesthetic/figural creativity
26	Associational fluency
27	Behavioral perception
28	Memory
29	Semantic problem detection and comprehension
	Physical Work Behavior
30	Removing material using stationary machines
31	Earth working and care/harvesting of plant life
32	Medical treatment

Table 2 (continued)

Factor Number	Factor Titles Presented Under OAI Section Titles
33	Repair and maintenance of machines and equipment
34	Combining and separating chemicals and other substances and materials
35	Building/repairing wooden structures and products
36	Fiber/thread working
37	Driving/operating vehicles and mechanized equipment
38	Surface finishing
39	Use of scientific and measuring devices/instruments
40	Operating material-joining equipment
41	Tending/feeding/offbearing stationary machines
42	Material forming
43	Use and handling of sporting equipment
44	Processing food materials
45	Working on the interiors and exteriors of buildings
46	Use of handling, holding, and supporting devices
47	Bonding, stitching, and fastening with portable powered tools
48	Measuring/inspecting physical characteristics
49	Applying heat and pressure to materials
50	Bonding, coating, and related activities using hand tools
51	Using foot-operated settings and controls
[b]52	Liquid application/coating
53	Working with animals
54	Abrading, shaping, cutting, and fusing with powered tools/ equipment
55	Testing and repairing electrical/electronic equipment
56	General assembling activities
57	Routine cleaning and object handling activities
	<u>Representational Work Behavior</u>
58	Verbal communication: speaking and writing
59	Clerical activities
60	Drafting and drawing
61	Electronic data processing
62	Communication by visual signals and auditory codes
63	Using visual and audio-visual equipment
64	Using written codes
65	Using keyboard and other office equipment
66	Performing numerical operations
67	Analyzing and synthesizing information
68	Recording information in writing
69	Using voice transmission devices

Table 2 (continued)

Factor Number	Factor Titles Presented Under OAI Section Titles
	Interpersonal Work Behavior
70	Organizing and supervising the work of others
71	Resolving conflicts
72	Serving/assisting
73	Being supervised
74	Instructing
75	Treating
76	Obtaining and giving information
77	Persuading
78	Entertaining/socializing
79	Assisting superiors
	Work Goals
80	Bookkeeping objectives
81	Electrical/electronic function objectives
82	Botanical objectives
83	Biological/health objectives
84	Technical planning/drawing objectives
85	Visual aesthetics objectives
86	Mechanical function objectives
87	Human behavior objectives
88	Environmental maintenance and planning objectives
89	Editing, proofing, and clerical objectives
90	Meteorological and astronomical objectives
91	Objectives related to animals
92	Organizational performance objectives
93	Material treatment/modification objectives
94	Performing arts objectives
95	Structural objectives
96	Terrain/earth planning and communication objectives
97	Sales and public relations objectives
98	Material handling/arrangement objectives
99	Electrical/electronic planning and communication objectives
100	Assembly/fabrication objectives
101	Terrain/earth modification and maintenance objectives
102	Biological/health inspection objectives

[a]This "factor" consists of OAI items that loaded on one of the interpreted poles of a bipolar factor.

[b]This factor is unnamed by Boese and Cunningham (1975).

Interpretations of the 21 Macro Clusters

As noted, the 21 macro clusters identified in the selected hierarchical solution accounted for 1269 of the total sample of 1414 jobs. The interpretations of those macro clusters, presented in this section, were based on the USES descriptions (job schedules), average OAI work-dimension (factor) score profiles, and education/job-preparation indices of the jobs comprising the various clusters.

Work-dimension profiles were derived for the 21 macro clusters by averaging the score profiles of the jobs within each cluster on the 102 first-order OAI factors employed in the cluster analysis. For cluster interpretation and description purposes, scores were computed for each job on 15 additional factors from the General Physical Requirements and Work Context sections of the OAI, and mean scores were computed for each macro cluster on those 15 factors. The same incomplete method used to compute scores for jobs on the 102 factors was used with the 15 additional factors (see Appendix A). Thus, a total of 117 OAI first-order factors, or work dimensions (listed in Appendix B), were used for cluster interpretation. Appendix D contains the work-dimension profiles for the 21 macro clusters in both raw and standard-score form. In the computation of the standard scores for clusters on each factor, the 21 cluster means comprised the standardization sample.

In addition to the 117 aforementioned work dimensions, a composite eight-point index reflecting education level and job-related preparation was used as an aid in cluster interpretation. This index, derived from two OAI work elements--Items 39m and 40m (see Appendix D for the derivation procedure), provided information concerning the general level and range of the education/job-preparation requirements in each macro cluster. Appendix D lists the jobs within each macro cluster in rank order according to their education/job-preparation index.

The interpretations which follow describe the most typical kinds of work activities, conditions, and requirements associated with the various macro clusters. Throughout each description, reference is made by title and/or identification number to particular OAI work dimensions which characterize the cluster in question (i.e., work dimensions for which the cluster had high or substantial scores), and OAI work elements comprising those dimensions are often used as more specific examples of the work activities and conditions involved. Table 18, Appendix B, presents the titles of the OAI work dimensions used in the cluster interpretations, and Tables 20 and 21, Appendix D, contain the work-dimension profiles for the clusters; a detailed description of these work dimensions can be found in a report by Boese and Cunningham (1975). A list of the jobs comprising each macro cluster is presented in Table 19, Appendix D.

Macro Cluster 1: Organizational and Human Relations Occupations

This cluster contains a broad spectrum of jobs in which workers deal with people and, often, with relatively high-level verbal and numerical information. Administrative, managerial, and supervisory jobs as well as jobs concerned with educating, advising, and counseling are included; specialists in finance, personnel, data processing, and writing also appear in this cluster. The work-dimension score profile highlights the behavioral requirements of the cluster, among which are: communication skills (work dimensions 11, 64, 82); the ability to comprehend, analyze, and synthesize semantic and numerical information (work dimensions 20, 21, 23, 29, 73); and the ability to deal with interpersonal relations (work dimensions 9, 27, 76, 77). (See Table 18, Appendix B, for a list of the work-dimension titles; Tables 20 and 21, Appendix D, for the work-dimension score profiles of the clusters.) The cluster also has a substantial score on organizational performance objectives (work dimension 98), which include: the development of organizational/business plans or innovations; effective management/employee relations; gathering, compiling, and analyzing data; and writing business/organizational reports, communications, and documents. Human behavior objectives (work dimension 93)--such as improved adjustment, adaptation, and knowledge of others--are also represented by a substantial score in the cluster profile. In addition, the cluster scored relatively high on responsibility and authority (work dimension 109) and on level of education/job preparation required (Table 19, Appendix D).

Some examples of jobs and associated DOT codes in this cluster are: Credit Manager (186.138), Advertising Manager (164.118), Motel Manager (320.137), Administrative Assistant (169.168), Personnel Manager (166.118), Mail Order Department Supervisor (231.138), Business Programmer (020.188), College Faculty Member (090.228), Psychologist (045.088), Secondary School Teacher (091.228), and Case Worker (195.108).

Macro Cluster 2: Clerical Occupations

This cluster contains clerical jobs in which workers deal with routine semantic, numerical, and symbolic information. As indicated by the cluster's work-dimension profile, its jobs frequently involve routine writing (work dimensions 11, 74), as well as classifying, comparing, checking, transcribing, and editing (work dimensions 24, 65, 71, 95). Representative activities for this cluster also include basic arithmetic computations and the recording, classifying, and checking of numerical data in keeping quantitative records and financial accounts (work dimensions 20, 72, 86). The use of various office machines such as calculators, adding and bookkeeping machines, typewriters, reproduction machines, and electronic data processing equipment may be required by jobs in this cluster (work dimensions 67, 71). It should be noted

that the work activities are often structured and subject to supervision (work dimensions 79, 111). While there is considerable variability in the level of education and job preparation required by the different jobs in this cluster, very high-level or very low-level requirements are not typical. (See Table 19, Appendix D.)

Some examples of jobs and associated DOT codes in this cluster are: Billing Clerk (219.388), Accounting Clerk (219.488), Insurance Clerk (210.368), Teller (212.368), Bookkeeper (210.388), Secretary (219.388), Typist (203.588), Key Punch Operator (213.582), Billing Machine Operator (214.488), and Financial Records Examiner (160.187).

Macro Cluster 3: Sales and Customer Service Occupations

The jobs in this cluster are primarily concerned with persuading or influencing customers to purchase any of a wide variety of services or commodities and/or with providing, upon request, information, services, or products (work dimensions 78, 83, 114). The degree of knowledge about these products and services varies considerably among the jobs; and the required level of education and job-related preparation varies to a considerable extent, with most jobs scoring in the middle range on the education/job-preparation scale (Table 19, Appendix D). The cluster's work-dimension score profile also indicates substantial involvement of the following factors: business-related numerical information (work dimension 2), direct business/sales information (work dimension 17), behavioral perception (work dimension 27), demonstrating (work dimension 80), obtaining and giving information (work dimension 82), and bookkeeping (work dimension 86).

Some examples of jobs and associated DOT codes in this cluster are: Building and Construction Salesman (276.358), Insurance Salesman (250.258), Financial Service Salesman (252.258), Tour Agent (255.358), Retail Advertising Salesman (258.358), Public Utilities Salesman (257.358), Furniture Salesman (274.358), General Salesperson (289.458), Customer Service Clerk (241.368), and Cashier (211.468).

Macro Cluster 4: Protective Service Occupations

The jobs in this cluster deal primarily with the protection of people or property against injury, loss, damage, fire, illegal acts, etc. It is not unusual for workers in those jobs to patrol restricted areas, carry out investigations, apprehend suspects, and testify in court. Behavioral information processing (work dimensions 9, 27), obtaining and giving information (work dimension 82), and the use of

communication devices (work dimension 75) are all prominent in the cluster's work-dimension profile. In addition, a high score was obtained on the presence of conflict in the work situation (work dimension 114). Most of the jobs score in the low to middle range on the education/job-preparation scale (Table 19, Appendix D).

Some examples of jobs and associated DOT codes in this cluster are: Patrolman (375.268), Store Detective (376.868), Security Guard (372.868), Corrections Officer (372.868), Watchman (372.368), House Officer (376.868), and Warehouse Investigator (376.868).

Macro Cluster 5: Material/Product Handling Inspecting, and Recording Occupations

The jobs in this cluster typically involve receiving, recording, distributing, inventorying, inspecting, and testing merchandise, materials, or products. Among the requirments involved are: clerical activities, including routine writing, copying/recording, comparing/checking, classifying/categorizing, and dealing with numbers (work dimensions 20, 65, 74); cleaning (work dimension 57); inspecting (work dimension 48); and material handling, such as properly locating or shelving merchandise (work dimension 104). Being supervised (work dimension 79) and a structured job context (work dimension 111) are also represented by substantial scores in the cluster's work-dimension profile. Relatively low to medium levels of education/job preparation are required in this cluster. (See Table 19, Appendix D.)

Some examples of jobs and associated DOT codes in this cluster are: Stock Clerk (223.367), Receiving Clerk (222.387), Shipping Clerk (222.587), Weigher and Recorder (224.487), Casting Inspector (514.687), Bulk Marker (209.588), and Parcel Post Clerk (231.388).

Macro Cluster 6: Occupations in Applied Physical Science/Technology

This cluster contains jobs involving the application of principles and techniques from such fields as engineering, electronics, mechanics, physics, and chemistry. Workers in this cluster deal with information concerning electrical/electronic devices and systems (work dimension 1), mechanical devices (work dimensions 6, 13), materials (work dimension 7), spatial and structural characteristics (work dimension 8), and the physical and chemical properties of materials/substances (work dimension 18). As might be expected, jobs in this cluster require the ability to comprehend, analyze, synthesize, and otherwise process relatively complex symbolic, semantic, and figural information (work dimensions 20, 21, 23, 28, 29, 72, 73); the use of scientific and measuring devices/

instruments is also required by many of the jobs (work dimensions 39, 48). Communication skills, especially of a technical nature, are important (work dimensions 64, 70, 95), and technical planning activities are often involved (work dimensions [illegible] 105). High levels of responsibility, authority, and creativity characterize many but not all of the jobs (work dimension 109), and scores on the education/job-preparation scale fall in the middle to high range (Table 19, Appendix D).

Some examples of jobs and associated DOT codes in this cluster are: Naval Architect (010.168), Nuclear Engineer (015.081), Tool Designer (007.081), Production Engineer (012.188), Electrical Engineer (003.081), Chemist (022.081), Pharmacist (074.181), Wood Technologist (040.081), Lab Technician (041.281), Industrial Waste Inspector (168.287), Physicist (023.081), and Radiologic Technologist (078.268).

Macro Cluster 7: Occupations in Electronic/ Electrical Equipment/Systems Operation

Jobs in this cluster involve the operation of electronic and electrical equipment in communication, transportation, and other systems (work dimensions 1, 39, 51, 75, 87). In some cases, the operation of transportation equipment may also be involved (work dimensions 6, 37, 61, 92). Oral and written verbal communication is often required as well as communication by code (work dimensions 64, 68, 70, 72, 82); such communication is frequently carried out with transmission devices (e.g., radio and telegraph--work dimensions 71, 75). Other activities may include routine numerical operations (work dimensions 2, 20, 86); the use of diagrams, schematics, and written materials pertaining to electronic, electrical, and mechanical equipment (work dimensions 1, 13); and activities related to the monitoring of atmospheric and weather conditions (work dimensions 4, 96). Some degree of psychomotor ability is required (work dimensions 58, 59, 60, 61), as well as the abilities to detect problems and memorize operations sequences (work dimensions 28, 29). Most of the jobs involve some responsibility for equipment, facilities, and/or the safety of others (work dimension 109). Scores on the education/job-preparation scale fall in the middle to upper range, i.e., from a high school diploma to a bachelor's degree (Table 19, Appendix D).

Some examples of jobs and associated DOT codes in this cluster are: Telegrapher (236.588), Air-Traffic Control Specialist (193.168), Dispatcher (239.285), Senior Radio Operator (193.132), Airplane Captain (196.163), Power Plant Operator (952.782), Signal Operator (239.368), and First Officer--Airline (196.283).

Macro Cluster 8: Farming, Forestry, and Other Botanically Related Occupations

This cluster consists of jobs concerned with planting, maintaining, cultivating, and harvesting crops, trees, and other forms of plant life. One of the requirements related to those objectives is the use of information pertaining to various aspects of the environment (work dimensions 4, 16)--including soil, plant life, water conditions, terrain, weather conditions, etc.--from direct contact and from such indirect sources as tables, charts, graphs, maps, instruments, and written materials. Effective management of farming and other botanical activities requires the development of plans and innovations (work dimensions 88, 94, 98, 102) and the various activities involved in carrying out the plans, such as: organizing and supervising others (work dimension 76), bookkeeping and other numerical activities (work dimensions 23, 74), and written communication (work dimensions 88, 94, 98, 102). Also involved are various physical activities and requirements associated with earth working and the care and maintenance of plant life, including the use of powered and non-powered hand tools and mechanized equipment (work dimension 31) and such general physical requirements as climbing/kneeling/stooping/crawling and dynamic strength/endurance (work dimensions 59, 63). Although the jobs in this cluster cover a wide range on the education/job-preparation scale, the majority require less than a college education (Table 19, Appendix D).

Some examples of jobs and associated DOT codes in this cluster are: Forester (040.188), Timber Agent (449.268), Grass Farmer (406.181), Logging Manager (162.158), Berry Grower (404.181), Tobacco Grower (405.181), Rose Grower (406.181), and Agriculturist (040.081).

Macro Cluster 9: Health-Related Occupations

The jobs in this cluster deal with various aspects of health, including diagnosis, treatment, prevention, and the general promotion of good health. Among the variety of activities involved are testing, diagnosing, and treating (work dimensions 32, 81, 89), instructing (work dimension 80), advising/counseling (work dimension 82), organizing and supervising (work dimension 76), and assisting (work dimension 85). In addition to its high scores on biological/health objectives (work dimensions 89, 108), the cluster has a substantial score on human behavior objectives (work dimension 93), including improvement in the adjustment/adaptation, knowledge, physical competence, and attitude of others. In carrying out their various activities, workers in this cluster use information pertaining to health (work dimension 3), people and human behavior (work dimensions 9, 19), animals (work dimension 12), and food (work dimension 15); oral and written communication of information is also required (work dimension 64). Among the mental requirements are: semantic thinking (work

dimensions 21, 29)--including such elements as idea production and expression, planning, problem detection and comprehension, and deductive reasoning; behavioral perception (work dimension 27), i.e., accurately perceiving and interpreting the behavior of others; and memory (work dimension 28). Consistent with the above interpretation, the cluster obtained a high score on social service context (work dimension 107), involving the opportunity to help others, and a substantial score on a context factor involving responsibility (work dimension 109). Although the entire range of the education/job-preparation scale is represented in this cluster, most of the jobs require training beyond the high school level, and approximately half of the jobs require one or more college/university degrees (e.g., B.S., M.S., Ph.D., M.D., D.D.S., D.V.M.). (See Table 19, Appendix D.)

Some examples of jobs and associated DOT codes in this cluster are: Dental Hygienist (078.368), Industrial Nurse (075.378), Psychiatric Aids (355.878), Psychiatrist (070.108), General Practitioner (070.108), Veterinarian (073.108), Dentist (072.108), Medical Laboratory Assistant (078.381), Occupational Therapist (079.128), and Rehabilitation Teacher of the Visually Impaired (094.208).

Macro Cluster 10: Personal Service Occupations

This cluster represents occupations in which workers attend or cater to the needs of customers. Jobs included in the cluster are drawn from such service areas as food and beverage, barbering/cosmetology, and amusement/recreation. As would be expected, serving and assisting people in a one-to-one relationship (work dimensions 78, 117) are prominent in the cluster profile; and a sales component is indicated by work dimensions 17, direct business/sales information, and 83, persuading. Some degree of coordination and dexterity is required (work dimension 58) in handling materials and merchandise (work dimension 104) and operating equipment (as suggested by work dimension 51). The jobs in this cluster score in the lower half of the education/job-preparation scale (Table 19, Appendix D).

Some typical jobs and associated DOT codes in this cluster are: Waitress (311.878), Bartender (312.878), Head Waiter (311.138), Skycap (357.878), Barber (330.371), Hair Colorist (332.271), Cosmetologist (332.271), Make-Up Specialist (332.361), Doorman (324.878), and Locker-Room Attendant (335.878).

Macro Cluster 11: Occupations in the Performing Arts

This cluster contains jobs concerned with entertaining audiences with performances in music, comedy, drama, etc., through media such as television, radio, stage, and film. The abilities to act, dance, write

musical scores, play an instrument, or direct a production are some of the requirements that might be associated with jobs in this cluster (work dimensions 10, 100). The cluster's factor-score profile suggests that creativity is an important requirement (see work dimensions 100, 109) and that the supervisory jobs in the cluster require the abilities to organize and direct people (work dimension 76), resolve interpersonal conflict (work dimension 77), and judge the performance of others (work dimensions 19, 93). High scores were also obtained on personal entertainment and socializing (work dimensions 84, 116).

It must be noted that very few Performing-Arts jobs were included in the total job sample and that Macro Cluster 11 consists of only four jobs. The cluster's factor-score profile was undoubtedly influenced by idiosyncracies in those jobs and must be considered as very tentative. The jobs and their associated DOT codes are: Musician (152.048), Music Supervisor (091.168), Bugler (152.048), and Executive Producer (159.118).

Macro Cluster 12: Occupations in Visual Aesthetics

The jobs comprising this cluster are concerned with the creative expression of original concepts, feelings, and moods in artistic designs, objects, and arrangements (work dimension 91). Specific jobs involve such objectives as creating or reproducing industrial designs for use in advertising; designing jewelry, furniture, or clothes; and creating paintings, sculptures, and other original art objects. Based on the cluster's work-dimension profile, the processing of information from sources such as color schemes, the form or shape of objects, sketches, models, etc., is very important (work dimension 5); information concerning the properties of materials such as fragility or strength, surface characteristics, or consistency (work dimension 7) is also used. In addition, the comprehension of spatial and structural characteristics (work dimensions 8, 14) and effective aesthetic/figural information processing and creativity (work dimensions 22, 25), in general, are important requirements. Specific activities performed by workers include fiber/thread working (work dimension 36), bonding and coating (work dimension 50), drafting and drawing (work dimension 66), material joining and forming (work dimensions 40, 42), and operating audio-visual equipment (work dimension 69). Most of the jobs in this cluster require training or education beyond the high school level (Table 19, Appendix D).

Some typical jobs and associated DOT codes in this cluster are: Illustrator (141.081), Display Man (298.081), Artist (144.081), Furniture Designer (142.081), Clothes Designer (142.081), Jewelry Designer (142.081), and Art Teacher (149.028).

Macro Cluster 13: Occupations in Animal Care and Handling

This cluster contains jobs that are primarily concerned with the welfare and performance of animals. Work activities include feeding, grooming, exercising, training, general handling, and treating minor injuries and diseases in such settings as farms, stables, kennels, pet stores, and zoos (work dimensions 32, 53, 89, 97). As would be expected, information concerning animals' appearance, performance, physical characteristics, and state of health and hygiene is important in this cluster (work dimensions 3, 12). Biological/health inspections and tests are also required by some of these jobs (work dimensions 89, 108). The care of animals includes maintaining a natural or comfortable physical environment and providing nutritious food (work dimensions 4, 15, 16, 31, 57, 94). Handling animals, especially the larger kinds, demands some strength and coordination, and these requirements are represented in the cluster's work-dimension profile (work dimensions 59, 60, 62). The jobs in this cluster tend to score in the lower half of the education/job-preparation scale (Table 19, Appendix D).

Some examples of jobs and associated DOT codes in this cluster are: Groomer (356.274), Stableman (356.874), Livestock Caretaker (466.887), Animal Keeper (356.138), Fish and Game Warden (379.168), Farm Hand (411.884), Hatchery Superintendent (436.138), and Pony Ride Attendant (349.878).

Macro Cluster 14: Occupations in Assembly and Fabrication

Jobs in this cluster involve the assembly and fabrication of various products through operations such as stitching, sewing, bonding, fusing, and mechanically fastening various parts and materials of cloth, leather, rubber, metal, plastic, and other synthetics (work dimensions 36, 40, 46, 47, 56, 106). Among examples of completed products are: metal furniture, small engines, dental equipment, instruments, electronic parts/equipment, and various textile products. The ability to process structural/spatial information concerning the interrelation, connection, and fastening of objects and parts in relation to prescribed standards (work dimensions 14, 106) is needed, as well as some degree of arm, hand, and finger coordination/dexterity (work dimension 58). In performing their activities, the workers use a variety of powered and non-powered hand tools and stationary machines/equipment (work dimensions 36, 40, 46, 47, 56). Most of the jobs in this cluster are structured and performed under rather close supervision (work dimensions 79, 111). Relatively little education or job preparation is required (Table 19, Appendix D).

Some examples of jobs and associated DOT codes in this cluster are: Engine Assembler (806.884), Module Assembler (726.887), Instrument

Assembler (701.884), Heavy Assembler (721.884), Sewing Machine Operator (786.782), Seamstress (782.884), Weaver (683.782), and Can Solderer (814.884).

Macro Cluster 15: Structural Work Occupations

This cluster represents occupations involving the construction, fabrication, installation, repair, and other preparation of structures, structured objects, and structural parts, such as: houses, buildings and other outdoor structures (e.g., bridges), smaller structural objects (e.g., hand-made furniture and cabinets), and various structural components (e.g., air ducts and ornamental iron work). (See work dimensions 35, 45, 101). The workers use various powered and non-powered hand tools and stationary machines/equipment to carry out such activities as: material joining through mechanical fastening (e.g., hammering, riveting, stapling, screwing, bolting), bonding (e.g., gluing, plastic welding), and fusing (e.g., welding, plastic heat fusing); material removing (e.g., drilling, grinding, sawing, shaping, cutting by heat); surface finishing/coating (e.g., abrading/polishing, scraping, liquid application/coating, covering); and forming (e.g., molding, casting, forging, bending.) (See work dimensions 30, 38, 40, 42, 46, 47, 50, 52, 54, 56). The performance of these activities requires: the processing of spatial/structural information from direct contact with the relevant objects/materials as well as from such indirect sources as drawings, diagrams, and written materials (work dimensions 8, 14, 22); knowledge of the characteristics of materials, especially wood, metal, surface-preparation/bonding substances, plastic, and masonry materials (work dimensions 7, 35, 42, 50, 52); and various physical capabilities, including arm, hand, and finger coordination/dexterity, dynamic strength/endurance, general body and arm/hand strength, and the ability to maintain uncomfortable or demanding body positions (work dimensions 58, 59, 62, 63). Hazardous conditions due to falling or moving objects, mechanical hazards, the possibility of burns, etc. are present to some degree in many of these jobs (work dimension 110), and it is not uncommon for this type of work to be performed outdoors. For the most part, the jobs in this cluster score in the lower half of the education/job-preparation scale (Table 19, Appendix D).

Some examples of jobs and associated DOT codes in this cluster are: Cabinet Maker (660.280), Patternmaker, wood (661.281), Carpenter (860.381), Sheet-Metal Worker (804.281), Welder (810.884), Bricklayer (861.381), and Shipfitter (806.381).

Macro Cluster 16: Mechanics and Stationary Machine/Equipment Repairers and Operators

Repairing, maintaining, installing, setting up, adjusting, and operating mechanical and electro-mechanical devices are the basic

activities in this cluster. The repair, maintenance, and installation activities apply to a variety of mechanical and electro-mechanical devices (e.g., diesel engines, air conditioners, knitting machines), while the setting-up, adjusting, and operating activities apply primarily to stationary industrial machines/equipment (e.g., knitting machines, armoring machines, punch presses). (See work dimensions 30, 33, 40, 41, 42, 46, 51, 56, 92.) Among the operations performed on the stationary machines are: material removing (e.g., drilling, shaping, grinding, sawing, cutting--work dimension 30), material joining (e.g., fusing, bonding, mechanical fastening--work dimension 40), material forming (e.g., molding, casting, rolling, extruding, forging--work dimension 42), and other kinds of material modification or treatment (e.g., heat, pressure, electrical action, threshing--work dimension 99). In carrying out their activities, workers process and use information obtained from direct contact with mechanical devices as well as from indirect sources such as displays, drawings, and written materials (work dimensions 6, 13, 22); information and knowledge concerning the characteristics of materials are also used (work dimension 7). Skill in the use of hand tools, especially those designed for mechanical fastening (e.g., wrenches, screwdrivers--work dimension 56), is needed and accounts, in part, for the cluster's substantial score on arm, hand, and finger coordination/dexterity (work dimension 58). General strength and body coordination, as well as the ability to maintain uncomfortable body positions, are also required (work dimensions 60, 62, 63). Some degree of hazard may be involved from such factors as moving objects, machinery, electrical shock, and burns. Although varying amounts of job-related preparation or training are required in this cluster, few of the jobs require more than a high school education.

Some examples of jobs and associated DOT codes in this cluster are: Loom Fixer (683.280), Air Conditioning Installer (806.781), Diesel Mechanic (625.281), Maintenance Mechanic (692.280), Extruding Machine Operator (691.782), Machinist (600.280), Screw Machine Set-Up Operator (604.380), Knitting Machine Operator (685.885), Punch-Press Operator (615.782), Automobile Mechanic (620.281), and Farm Equipment Mechanic (624.821).

Macro Cluster 17: Occupations in Stationary Machine/Equipment Tending, Feeding, and Offbearing

The jobs in this cluster are primarily concerned with the operation of stationary machines or equipment that process or treat materials/substances in various ways (work dimension 99), including: heat and pressure treatment (e.g., heat drying, steaming, pressing, firing, baking--work dimension 49), material forming (e.g., molding, rolling, extruding, bending), combining or separating materials/substances

(e.g., mixing, blending, stirring, threshing, filtering--work dimension 34), material joining (e.g., fusing, bonding, mechanical fastening--work dimension 40), and, to some lesser extent, fiber/thread working (e.g., stitching, sewing, weaving, twining--work dimension 34). Basic work activities include: machine/equipment tending--that is, starting, stopping, making minor adjustments, and keeping watch over automatic machines or equipment where limited judgment is required; and feeding/offbearing--providing materials for and/or taking products from processing machines or equipment (work dimensions 6, 41). It should be noted that the workers' interaction with machines in this cluster is of a less skilled nature than that of the stationary machine operators in Macro Cluster 16, who are often responsible for setting up and adjusting their equipment as well as for making critical judgments and control decisions while the equipment is in operation. The context for these jobs tends to be structured, with standardized procedures and tasks (work dimension 111) and rather close supervision (work dimension 79). Some of the jobs involve exposure to heat and humidity (work dimension 115). Relatively little education or job-related preparation is required for most of these jobs.

Some examples of jobs and associated DOT codes in this cluster are: Wrapping Machine Operator (920.885), Crushing Machine Operator (521.885), Braiding Machine Operator (689.885), Assembler Machine Operator (692.885), Sealing Machine Operator (641.885), Pants Presser (363.885), Drier Operator (553.885), Polisher (700.884), Conditioner Tender (582.885), and Automatic Feeder Operator (413.585).

Macro Cluster 18: Routine Object/Material Handling and Cleaning Occupations

The jobs in this cluster involve elemental, repetitive physical tasks requiring little skill, education, or training. (See Table 19, Appendix D.) Included are such object handling/manipulation activities as sorting, stacking, boxing, wrapping, arranging, folding, polishing, general cleaning (e.g., sweeping, scrubbing, washing, mopping, dusting), routine maintenance, and elemental machine feeding/offbearing (work dimensions 38, 45, 52, 57, 104). Routine inspecting tasks may also be included. The activities are rather structured or standardized (work dimension 111) and are often performed under close supervision (work dimension 79). As might be expected, these activities require some degree or arm/hand/finger coordination and dexterity (work dimension 58) and general body strength and mobility (work dimensions 62, 63).

Some typical jobs and associated DOT codes in this cluster are: Light Cleaner (389.887), Maid (323.887), Building Custodian (381.887), Washer (361.887), Apple Packer (920.887), Garment Packer (920.887), Cannery Worker (529.886), Labeler (920.886), Laborer (509.886), Yardman (304.887), and Peanut Sorter (521.887).

Macro Cluster 19: Occupations in Mechanized Equipment and Vehicle Operation

Workers in this cluster operate or drive forklifts, bulldozers, cranes, power shovels, tractors, trucks, cars, etc. (work dimensions 6, 37, 51, 92) for such purposes as transporting or moving materials or people, modifying or maintaining terrain/earth features, extracting earth materials, and maintaining or harvesting crops (work dimensions 31, 107). Considerable tracking ability is required to steer or guide equipment/vehicles, as well as some degree of general balance and body coordination for the various physical activities associated with operating, maintaining, and mounting/dismounting equipment (work dimensions 60, 61). A limited knowledge of mechanics may be required to detect and identify mechanical malfunctions and perform minor maintenance and repair (work dimensions 6, 92). Workers in these jobs are subjected to some degree of supervision (work dimension 79) and are sometimes exposed to physical hazards (usually from mechanical devices and moving or falling objects) and to physical discomfort (dirt, noise, vibration, heat, etc.) (work dimension 110). The jobs in this cluster score in the lower half of the education/job-preparation scale (Table 19, Appendix D).

Some examples of jobs and associated DOT codes in this cluster are: Log Stacker Operator (942.883), Locomotive Crane Operator (921.883), Chauffeur (913.883), Power-Shovel Operator (779.883), Gasoline Truck Operator (922.883), Tractor Driver (401.883), and Sand-Slinger Operator (518.883).

Macro Cluster 20: Electricians, Electronic Technicians, and Related Occupations

The primary activities in this cluster include testing, repairing, maintaining, servicing, installing, and assembling electrical/electronic devices, equipment, and systems (work dimensions 33, 46, 48, 54, 55, 56, 87, 106). Some of the jobs may also involve plan formulation, written communication, and the development of schematics and diagrams related to the above activities (work dimension 105). Workers process and use information obtained from direct contact with devices and equipment, from testing and measuring instruments, and from diagrams, schematics, and written materials (work dimensions 1, 8, 14, 15); much of this information is of a spatial nature, involving interrelations among various parts and objects and requiring some ability in figural information processing (work dimensions 8, 14. 22). Memory of operations sequences, symbols, and physical relationships and characteristics (e.g., parts and connections) is also required (work dimensions 22, 70), as well as some degree of arm, hand, and finger coordination/dexterity (work dimension 58). Many of the activities require the use of various tools, sometimes with considerable precision (work dimensions 33, 46, 54, 56). The work is often performed in structured situations and under supervision (work dimensions 79, 111). Scores range from quite

low to moderately high on the education/job-preparation scale; however, none of the jobs comprising this cluster requires a college degree (Table 19, Appendix D).

Some typical jobs and associated DOT codes in this cluster are: Electrician (842.281), Radio Mechanic (823.281), Electronic Technician (003.181), Electronics Mechanic (828.281), Television Service and Repairman (720.281), Solderer (710.884), Electronic Sensing Equipment Assembler (716.884), Senior Communications Electrician (822.131), and Lineman (821.381).

Macro Cluster 21: Occupations in Food Processing/Preparation

The jobs in this cluster involve various activities related to food processing and preparation, including: combining (e.g., mixing, stirring, blending), applying heat or pressure (e.g., cooking, baking), cutting and grinding, cleaning (e.g., washing, scraping), inspecting/measuring, and handling/arranging (e.g., sorting, packing, shelving, wrapping). (See work dimensions 34, 44, 48, 49, 57, 99, 104, 108.) Workers are often required to make judgments based on direct sensory information from materials being processed (e.g., flavor, odor, color, texture--work dimension 15). Utensils such as knives, ladles, spoons, and spatulas and food processing or storage equipment such as ovens, stoves, mixing and slicing machines, freezers, refrigerators, scales, urns, vats, etc. are used in these jobs (work dimensions 34, 41, 44, 46, 48, 49). Some of the jobs involve a moderate risk of injury (burns, cuts, etc.) and exposure to heat, cold, wetness, and humidity (work dimensions 110, 115). The labor demands in some of these jobs may vary with seasonal and production-demand factors, and there may be some irregularity in daily or weekly work schedules (work dimension 112). Most of the jobs score in the lower half of the education/job-preparation scale (Table 19, Appendix D).

Some typical jobs and associated DOT codes in this cluster are: Meat Cutter (316.884), Fish Cleaner (525.884), Cook Helper (313.884), Baker (313.781), Cook (313.381), Short Order Cook (314.381), Chef (313.131), Seasoning Mixer (520.887), and School Lunch Supervisor (313.131).

Macro-Cluster Profiles on Additional Variables

In addition to the average profiles, or centroids, for the macro clusters on the factors used in the hierarchical cluster analysis, average profiles were computed for each macro cluster on two other sets of variables: (a) 470 selected OAI work elements (items) and (b) 102 OAI-based human attribute-requirement estimates derived by Pass and Cunningham (1975). A cluster's profile on each set of variables consisted of the mean variable values of the jobs comprising the cluster.

The mean profiles for the 21 macro clusters on the 102 attribute-requirement estimates are contained in Appendix E. The profiles on the 470 OAI work elements are not presented because of the prohibitively large amount of data involved.

Homogeneity of the Macro Clusters

A homogeneity index was computed for each of the 21 macro clusters consisting of the mean pair-wise correlation between the factor-score profiles of the jobs comprising the cluster. The pair-wise correlations among jobs were based on the same factor-score profiles employed in deriving the selected cluster analytic solution, i.e., the profiles containing 102 OAI first-order factor scores (see Table 2).

Table 3 presents the resultant homogeneity indices for the 21 macro clusters. As shown, the values of these indices range from .477 to .695; the median value is .566. It should be noted that the cluster homogeneity index in Table 3 differs from the homogeneity index that was computed by the cluster analytic program and used in macro cluster identification. (See Appendix C for the formula for the latter index.)

Table 3

Average Pair-Wise Correlation Coefficient (or Homogeneity Index) Among Jobs Within Each of the 21 Macro Clusters

	Macro Cluster Title	Number of Jobs	Homogeneity Index
1	Organizational and Human Relations	195	.650
2	Clerical	155	.695
3	Sales/Customer Service	171[a]	.620
4	Protective Service	13	.639
5	Material/Product Handling, Inspecting, and Recording	62	.647
6	Applied Physical Science and Technology	90	.552
7	Electronic/Electrical Equipment/Systems Operation	12	.558
8	Farming, Forestry, and Botanical	20	.509
9	Health-Related	44	.532
10	Personal Service	31	.479
11	Performing Arts	4	.552
12	Visual Aesthetics	14	.562
13	Animal Care and Handling	16	.477
14	Assembly/Fabrication	70	.644
15	Structural Work	30	.656
16	Mechanics and Stationary Machine/Equipment Repairers and Operators	112	.567
17	Stationary Machine/Equipment Tending, Feeding, and Offbearing	98	.566
18	Routine Object/Material Handling and Cleaning	66	.623
19	Mechanized Equipment and Vehicle Operation	27	.566
20	Electricians and Electronic Technicians	22	.690
21	Food Processing/Preparation	33	.539

[a]Because of a clerical error, 16 of the 171 jobs did not belong in this cluster.

Stability of the Macro Clusters

The procedure for testing the stability, or replication, of the macro clusters involved: (a) dividing the total sample of 1414 jobs into two comparable subsamples of 707 jobs each; (b) cluster analyzing each subsample of jobs separately based on the jobs' factor-score profiles; (c) matching the resultant macro clusters across the two subsamples on a judgmental basis; and (d) correlating the centroid (average factor-score profile) of each cluster in Subsample A with the centroid of every cluster in Subsample B, in order to determine whether the judgmentally matched clusters correlated substantially and more highly with each other than with the remaining clusters.

Using a stratified random selection procedure, Boese and Cunningham (1975) had previously divided the total sample of 1414 jobs into two comparable subsamples of 707 jobs each. In the present study, each of the two subsamples was subjected to a separate hierarchical cluster analysis based on the jobs' profiles on the set of 102 OAI factors, and 23 macro clusters were identified in each of the two solutions according to the procedure described previously for the total sample. Each of the 23 clusters in Subsample A was then matched on a judgmental basis with a cluster in Subsample B. In addition, each cluster in the two subsamples was matched with one of the 21 macro clusters in the total sample. Finally, the centroid of each cluster in Subsample A was correlated with the centroid of every cluster in Subsample B, and the centroid of each cluster in both subsamples was correlated with the centroid of every cluster in the total sample. Thus, three correlation matrices were obtained: (a) a 23-by-23 matrix of correlations between clusters in the two sub-samples; (b) a 23-by-21 matrix of correlations between clusters in Subsample A and the total sample; and (c) a 23-by-21 matrix of correlations between clusters in Subsample B and the total sample.

Table 4 presents the Pearson correlations between clusters in the two subsamples. As shown, the judgmentally matched clusters had the highest correlations with each other in all but three cases. In two of those three cases, the matched clusters obtained the second highest correlation out of all possible pair-wise correlations involving them while in the third case the correlation between the two matched clusters equalled the highest correlation of those clusters with clusters to which they were not matched. The median correlation between all matched clusters from the two subsamples was .903.

The correlations of the clusters from the two subsamples with the clusters from the total sample are shown in Appendix F. All of the matched clusters between Subsample A and the total sample and all but two of the matched clusters between Subsample B and the total sample correlated more highly with each other than with clusters to which they were not matched. In the two instances where matched clusters

Table 4

Pearson Correlations Between the Average Factor-Score Profiles of the 23 Macro Clusters Derived from Subsample A and the Average Factor-Score Profiles of the 23 Macro Clusters Derived from Subsample B[a]

Sub-Sample B Clusters	Subsample A Clusters											
	1	2	3	4	5	6	7	8	9	10	11	12
1	.857	.781	.984*	.797	.626	.655	.710	.491	.561	.543	.403	.542
2	.714	.687	.891	.903*	.578	.587	.763	.438	.582	.480	.387	.424
3	.872*	.659	.783	.654	.856	.872	.841	.579	.387	.607	.487	.589
4	.990*	.842	.770	.647	.736	.704	.579	.655	.629	.728	.432	.583
5	.739	.614	.571	.529	.593	.798*	.537	.475	.399	.490	.342	.493
6	.819	.988*	.672	.707	.562	.526	.484	.684	.611	.583	.378	.503
7	.764	.575	.648	.598	.964*	.740	.871*	.602	.352	.601	.420	.524
8	.530	.466	.667	.551	.477	.417	.645	.252	.573	.340	.256	.740*
9	.698	.576	.451	.436	.485	.436	.438	.498	.557	.965*	.326	.393
10	.616	.523	.503	.412	.363	.387	.370	.443	.463	.395	.721*	.367
11	.465	.393	.387	.434	.346	.418	.423	.225	.533	.640	.241	.332
12	.398	.430	.274	.349	.549	.374	.380	.862*	.203	.303	.298	.224
13	.054	.110	.125	.251	.333	.056	.278	.211	.056	.098	.225	.140
14	.144	.163	.181	.299	.457	.172	.376	.318	.034	.163	.236	.169
15	.233	.207	.263	.328	.627	.268	.481	.236	.039	.220	.327	.278
16	.300	.372	.378	.612	.372	.273	.452	.302	.203	.307	.394	.366
17	.159	.229	.314	.442	.297	.111	.465	.096	.206	.156	.251	.214
18	.111	.232	.170	.419	.106	.044	.255	.131	.199	.154	.200	.132
19	.307	.362	.295	.342	.356	.248	.335	.217	.292	.290	.429	.377
20	.449	.520	.372	.329	.290	.222	.244	.255	.646*	.499	.331	.584
21	.192	.155	.208	.285	.570	.220	.427	.208	.077	.177	.165	.225
22	.275	.372	.248	.492	.229	.137	.380	.213	.209	.306	.153	.190
23	.312	.638	.344	.399	.138	.131	.232	.246	.547	.265	.271	.311

[a]See footnote on following page.

Table 4 (continued)

Sub-Sample B Clusters	Subsample A Clusters (continued)										
	13	14	15	16	17	18	19	20	21	22	23
1	.451	.374	.229	.240	.117	.343	.159	.241	.422	.013	.179
2	.403	.409	.418	.440	.266	.474	.271	.349	.529	.167	.297
3	.335	.519	.155	.136	.108	.350	.229	.346	.344	-.026	.130
4	.576	.367	.070	.111	.010	.264	.108	.185	.338	-.103	.065
5	.382	.279	.029	.067	-.003	.228	.106	.145	.243	.064	.079
6	.817	.325	.161	.258	.092	.322	.156	.208	.435	.002	.159
7	.347	.702	.312	.208	.299	.505	.393	.586	.428	.052	.144
8	.259	.471	.392	.311	.232	.319	.159	.298	.352	.252	.096
9	.552	.234	.118	.227	.096	.281	.159	.144	.392	-.050	.312
10	.265	.140	.020	.068	-.035	.113	-.028	-.008	.147	-.125	-.063
11	.356	.172	.197	.296	.098	.270	.138	.168	.470	.203	.833*
12	.339	.331	.218	.225	.324	.468	.535	.420	.216	.060	-.004
13	.223	.518	.594	.575	.967*	.887*	.844	.711	.268	.433	.126
14	.213	.502	.487	.468	.785	.745	.957*	.767	.297	.305	.141
15	.238	.659	.675	.437	.620	.713	.673	.975*	.347	.550	.135
16	.480	.361	.667	.854*	.637	.757	.623	.566	.564	.446	.329
17	.343	.343	.981*	.757	.568	.685	.506	.653	.602	.615	.265
18	.512	.173	.606	.953*	.517	.566	.464	.374	.544	.435	.360
19	.466	.311	.614	.543	.436	.553	.444	.526	.318	.772*	.173
20	.615	.276	.384	.397	.296	.389	.248	.286	.297	.424	.166
21	.132	.921*	.363	.300	.716	.592	.555	.675	.210	.223	.066
22	.526	.155	.516	.600	.217	.369	.259	.290	.910*	.164	.336
23	.784*	.229	.391	.466	.300	.327	.224	.245	.318	.309	.164

[a]Asterisks identify a priori matched clusters from the two subsamples. In two cases, two clusters from Subsample A were matched with one cluster from Subsample B, and in two cases, two clusters from Subsample B were matched with one cluster from Subsample A.

did not correlate most highly with each other, the matched clusters had the second highest correlations. Table 5 presents the correlation of each macro cluster in Subsamples A and B with its judgmentally matched cluster in the total sample. The median correlation for matched clusters between Subsample A and the total sample was .941, and the corresponding value for Subsample B was .967.

Discriminability Among the Macro Clusters

The Kruskal-Wallis H Test (Winer, 1971) was used to test for discriminability among the 21 macro clusters in terms of the 102 OAI first-order factors. The H test, analogous to a single classification analysis of variance, was applied separately to each of the 102 factors. In each of the 102 separate analyses, the 21 macro clusters comprised the classification (or "treatment") variable, and the factor scores of the individual jobs in the clusters served as the observations (or "dependent" variable). The Kruskal-Wallis procedure was used because it does not assume homogeneity of variance across treatment groups. The results are shown in Appendix G, where it can be seen that there were significant differences ($p < .01$) among the 21 clusters on all 102 factors; i.e., the H value was statistically significant for each of the 102 factors.

In another analysis related to cluster discriminability, Pearson correlations were computed among all of the 21 macro clusters based on their average profiles, or centroids, on the 102 factors. The resultant correlation matrix is contained in Appendix G. The values of the correlations range from .84 to .04, with a median value of .37.

The Micro (Second-Level) Clusters

As noted, 88 micro-level occupational clusters were identified in the selected cluster solution. These clusters were located in the hierarchical structure at stages preceding the 21 macro clusters. Thus, the micro clusters are narrower than and subsumed by the macro clusters. Based on an examination of the jobs in the various micro clusters, it was judged that some of those clusters were closely related even though they did not merge before joining the same macro clusters. Accordingly, it was decided to arrange the judgmentally related micro clusters under titled categories within each macro cluster. Appendix H contains a list of the jobs in each of 47 titled micro clusters or micro-cluster categories. These 47 titles are also shown in Table 6 under their respective macro clusters. It should be noted that eight of the macro clusters were not subdivided into micro clusters; however, six of those macro clusters contain 20 or fewer jobs.

Table 5

Pearson Correlations of the Centroids (Average Factor-Score Profiles) of the Macro Clusters from Subsamples A and B with the Centroids of Judgmentally Matched Macro Clusters from the Total Job Sample[a]

	Macro Clusters from Total Sample	r: Subsample A with Total Sample[b]		r: Subsample B with Total Sample[b]	
1	Organizational and Human Relations	.99	(1)	.89,.98	(3,4)
2	Clerical	.99	(3)	.99	(1)
3	Sales/Customer Service	.99	(2)	.99	(6)
4	Protective Service	.85	(9)	.85	(20)
5	Material/Product Handling, Inspecting, and Recording	.94	(4)	.90	(2)
6	Applied Physical Science and Technology	.97,.86	(5,7)	.99	(7)
7	Electronic/Electrical Equipment/Systems Operation	.89	(12)	.89	(8)
8	Farming, Forestry and Botanically Related Occupations	.84	(6)	.92	(5)
9	Health-Related Occupations	.98	(10)	.98	(9)
10	Personal Service	.95	(13)	.81	(23)
11	Performing Arts	.83	(11)	.98	(10)
12	Visual Aesthetics	.90	(8)	.94	(12)
13	Animal Care	.89	(23)	.96	(11)
14	Assembly/Fabrication	.95,.91	(17,18)	.98	(13)
15	Structural Work	.96	(19)	.98	(14)
16	Mechanics and Machine/Equipment Repairers and Operators	.97	(20)	.99	(15)

Table 5 (continued)

	Macro Clusters from Total Sample	r: Subsample A with Total Sample[b]		r: Subsample B with Total Sample[b]	
17	Machine/Equipment Tending, Feeding, and Offbearing	.99	(15)	.98	(17)
18	Routine Object/Material Handling and Cleaning	.97	(16)	.93,.93	(16,18)
19	Mechanized Equipment and Vehicle Operation	.90	(22)	.95	(19)
20	Electricians and Electronic Technicians	.93	(14)	.96	(21)
21	Food Processing/Preparation	.93	(21)	.99	(22)

[a]Twenty-three macro clusters were derived in each of the two subsamples, while 21 macro clusters were derived from the total job sample.

[b]The entries in parentheses are the identification numbers of the subsample clusters. In some instances, two subsample clusters were matched with a total-sample cluster.

The possibility was considered that more meaningful micro clusters might be obtained by cluster analyzing the jobs within each of the separate 21 macro clusters using 470 selected OAI work elements as profile variables. In this regard, it was reasoned that since the OAI work elements are more specific than the OAI factors, the work elements might provide a better basis for comparing and grouping jobs at the micro-cluster level. Accordingly, an exploratory cluster analysis was performed on the jobs in Macro Cluster 1 (Organizational and Human Relations Occupations) using the 470 OAI work elements as profile variables and the same cluster analytic procedure as in the previous analyses. A comparison of the solution from this exploratory analysis with the original micro clusters identified under Macro Cluster 1 (i.e., the micro clusters identified in the solution involving 102 factors and all 1414 jobs) showed the original solution to be superior. Based on that finding, the exploratory approach was abandoned.

Table 6

Forty-Seven Micro Clusters or Micro-Cluster Categories Arranged Under Their Respective Macro-Cluster Titles

1. Organizational and Human Relations Occupations

1. High-Level Administrators and Managers
[a]2. Mid- and Lower-Level Administrators and Managers
3. Educators, Advisors, and Counselors
4. Research and Data Processing/Analysis Specialists and Managers
5. Writers
6. Miscellaneous Organizational and Human Relations Occupations

2. Clerical Occupations

7. Computing and Account Recording Occupations
8. Occupations Involving Credit and Cash Handling Operations
9. Secretarial Occupations
10. Keyboard Office Machine Operators
11. Electronic Data Processing Equipment Operators
12. Material/Production Recording Clerks
13. File Clerks and Related Occupations
14. Miscellaneous Clerical Occupations

3. Sales and Customer Service Occupations

[a]15. Salespersons and Agents, Services
[a]16. Salespersons, Commodities
[a]17. Sales Clerks and Counterpersons
[a]18. Miscellaneous Merchandising Occupations

NOTE: The footnotes appear at the end of the table.

Table 6 (continued)

4. Protective Service Occupations[b]

5. Material/Product Handling, Inspecting, and Recording Occupations

19. Material/Product Handling and Recording Occupations

20. Material/Product Inspecting and Testing Occupations

6. Occupations in Applied Physical Science and Technology

[a]21. Architectural, Engineering, and Related Occupations

22. Electrical Engineering and Related Occupations

[a]23. Managers and Operators of Production Operations/Systems

24. Chemists, Pharmacists, and Related Occupations

[a]25. Miscellaneous Occupations in Applied Physical Science and Technology

7. Occupations in Electronic/Electrical Equipment/Systems Operation[b]

8. Farming, Forestry, and Other Botanically Related Occupations[b]

9. Health-Related Occupations

26. Medical/Health Nurses, Technicians, and Assistants

27. Medical/Health Doctors and Technologists

[a]28. Miscellaneous Health-Related Occupations

10. Personal Service Occupations

29. Food and Beverage Service Occupations

[a]30. Miscellaneous Personal Service Occupations

Table 6 (continued)

11. Occupations in the Performing Arts[b]

12. Occupations in Visual Aesthetics[b]

13. Occupations in Animal Care[b]

14. Occupations in Assembly and Fabrication

31. Occupations in the Assembly and Fabrication of Various Products

[a]32. Occupations in the Assembly and Fabrication of Textile Products

15. Structural Work Occupations

33. Carpentry

[a]34. Structural Construction and Repair Occupations

16. Mechanics and Stationary Machine/ Equipment Repairers and Operators

[a]35. Mechanics and Machinists

[a]36. Miscellaneous Stationary Machine/Equipment Operators

37. Stationary Forming Machine/Equipment Operators

38. Textile Machine/Equipment Operators

[a]39. Processing System/Plant Operators

[a]40. Miscellaneous Mechanical-Related Occupations

17. Occupations in Stationary Machine/Equipment Tending, Feeding, and Offbearing[b]

18. Routine Object/Material Handling and Cleaning Occupations[b]

Table 6 (continued)

19. Occupations in Mechanized Equipment and Vehicle Operation

41. Mechanized Equipment Operators

42. Vehicle Operators

20. Electricians, Electronic Technicians, and Related Occupations

43. Electricians and Electronics Technicians

44. Occupations in Assembly and Repair of Electrical/Electronic Components and Devices

21. Occupations in Food Processing/Preparation

45. Food Processing Laborers and Kitchen Workers

46. Food Preparation Specialists and Managers

47. Miscellaneous Occupations in Food Preparation

[a]This title represents a judgmentally established category containing more than one micro cluster.

[b]There were no micro clusters identified under this macro cluster.

SUMMARY AND DISCUSSION

This part of the report is divided into three sections: (a) a summary of the study and comments related to its technical aspects, (b) a consideration of the meaningfulness of the results, and (c) a discussion of possible future research.

Summary and Technical Comments

The purpose of this study was to derive an OAI-based occupational cluster structure which, with future refinement, might provide a suitable framework and some of the content for the development of an information system applicable to occupational exploration and guidance.

In previous research, a sample of 1414 jobs representing the U. S. work structure was rated on the Occupation Analysis Inventory, a comprehensive instrument containing 622 "work elements" describing various kinds of work activities and conditions. Factor analyses of the job ratings on the 622 OAI elements yielded 132 first-order and 28 higher-order factors, or "work dimensions."

In the present study, the 1414 jobs were profiled on three separate sets of OAI first-order factors, and three corresponding 1414-by-1414 job similarity matrices were computed containing the pair-wise Pearsonian correlations between the jobs' factor-score profiles.[3] A hierarchical cluster analysis procedure was then applied separately to each of the job similarity matrices, and the three resultant cluster solutions were compared judgmentally for meaningfulness and comprehensiveness. Based on those comparisons, it was determined that a cluster analysis employing 102 selected OAI first-order factor (or work-dimension) scores as profile variables produced the best solution.

In the selected hierarchical cluster solution, 21 rather broad "macro" clusters were identified which accounted for 1269 jobs out of the total sample of 1414. In addition, 88 narrower "micro" (or sub-) clusters were identified at stages preceding the 21 macro clusters in the hierarchical structure; that is, micro clusters were identified that were more specific than and subsumed by the macro clusters. Of the 21 macro clusters, 13 contained two or more micro clusters, and eight were not subdivided into micro clusters.

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[3] A preliminary study described in Appendix A showed the Pearsonian correlation to be superior within this particular context to certain other profile similarity indices (such as d^2).

Of the 1414 jobs in the sample, 145 were judged not to merge into meaningful clusters within the derived hierarchy and were, therefore, excluded from the defined cluster structure. Another 56 jobs were judged to be assigned to the wrong macro clusters, and 18 additional jobs were judged as being in the appropriate macro clusters but not in the appropriate micro clusters. Rating error and idiosyncracies in job activities in relation to job titles would probably account for a large proportion of those non-clustered and misplaced jobs; i.e., some of the jobs were incorrectly rated on the OAI work elements, and some jobs were unrepresentative of the occupations (job classes) whose titles they bore.

Upon further examination, some of the micro clusters appeared to be closely related within macro clusters, even though they did not merge before joining the same macro clusters. Accordingly, it was decided to combine certain judgmentally related micro clusters under common titles within nine of the macro clusters. Essentially, this step reduced the 88 micro clusters to 47 titled categories, with 30 of those categories representing single micro clusters and 17 representing mergers of two or more micro clusters. (The 47 micro-level titles were presented in Table 6.)

The 21 macro clusters varied considerably in their breadth and inclusiveness. Thus, Macro Cluster 1, Organizational and Human Relations Occupations, contained 14 micro clusters and 195 jobs, while at the other extreme, eight of the macro clusters contained no micro clusters and six of those macro clusters contained 20 or fewer jobs. This variability in the size and breadth of the macro clusters might be attributed to at least three factors: (a) the numbers of jobs sampled from the various occupational divisions in the DOT, (b) the specificity or generality of the OAI work dimensions (factors) that were most important in forming a particular cluster, and (c) the judgment of the investigators as to the point where the merging process should stop for each cluster. Regarding the first factor, it is reasonable to assume that in cases where the sample contained only small numbers of jobs representing certain homogeneous classes in the occupational structure, such jobs would combine relatively early in the hierarchical analysis to form small clusters that would maintain their independence until the latter stages of the analysis; those small but stable clusters, though possibly underrepresented in the job sample, might, nevertheless, represent important homogeneous classes in the job population. In connection with the second factor, it would appear that the broader and larger macro clusters are based on OAI work dimensions of a more general nature than those characterizing some of the smaller and narrower macro clusters. For example, the very large and inclusive Organizational and Human Relations cluster is characterized by high scores on the rather general representational (semantic/symbolic) and interpersonal relations factors, while some of the smaller and narrower clusters (such as the Electricians, Electronic Technicians, and Related Occupations cluster) tend to be characterized by more specific content and hardware oriented factors. Thirdly, it should be noted that although the within-cluster homogeneity index was used as a guide in determining when the merging process should

stop for each cluster, the final decision rested on the investigators' judgment of a cluster's "face validity." Thus, there was some room for debate (and error) in selecting the stage at which a macro cluster was complete. Indeed, as will be described subsequently, it was later decided that one of the original "macro" clusters, Organizational and Human Relations Occupations, should be broken out into its constituent "micro" clusters. Despite, however, the possible influence of the aforementioned factors, the variation in the size and scope of the OAI-based macro clusters is not, ipso facto, an indication of their invalidity. There is no basic principle that phenomena are inherently distributed into classes of equal size and scope, and this is not, in fact, characteristic of most existing classificatory systems.

By far the broadest of the 21 macro clusters identified in this study was Macro Cluster 1: Organizational and Human Relations Occupations. This cluster contains 14 micro clusters arranged under the following titled categories: High-Level Administrators and Managers; Mid- and Lower-Level Administrators and Managers; Educators, Advisors, and Counselors; Research and Data Processing/Analysis Specialists and Managers; Writers; and Miscellaneous Organizational and Human Relations Occupations. With the exception of the Mid- and Lower-Level Administrators category, which contains nine judgmentally related micro clusters, each of the above titles represents a single micro cluster that formed prior to merging into Macro Cluster 1. The wide breadth of Macro Cluster 1 probably does not lend itself to the ultimate purpose envisioned for the OAI-based cluster structure--namely, to provide a framework for occupational exploration and guidance. Accordingly, it would seem reasonable at this point to break that macro cluster out into its constituent micro-level categories, assigning each of those categories the status of a "macro," or major, cluster. If this is done for all of the micro-level categories in Macro Cluster 1 except Miscellaneous Organizational and Human Relations Occupations, which contains only two jobs, the number of major clusters in the OAI structure is increased from 21 to 25. The titles of these 25 major OAI clusters are presented in the left-hand column of Table 7 (p. 45).

Subsequent to their derivation, the original 21 macro clusters were analyzed for homogeneity, stability, and discriminability. The homogeneity analysis involved computing the average pair-wise correlations among the factor-score profiles of the jobs comprising each macro cluster. The resultant 21 average profile correlations, or within-cluster homogeneity indices, ranged from .48 to .70, with a median value of .57. These results can be interpreted as an indication of moderate homogeneity within the macro clusters.

The analysis of cluster stability, or replicability, consisted essentially of (a) dividing the total sample of 1414 jobs into two comparable subsamples of 707 jobs each; (b) cluster analyzing each subsample of jobs separately, based on intercorrelations among the jobs' factor-score profiles; (c) judgmentally matching the resultant macro clusters across the two subsamples; and (d) correlating the centroid

(average factor-score profile) of each cluster in Subsample A with the centroid of every cluster in Subsample B to determine whether the judgmentally matched clusters correlated more highly with each other than with the remaining clusters. In the large majority of the cases, the correlations between judgmentally matched clusters were, in fact, both substantial (median r = .90) and higher than the correlations between non-matched clusters, though several clusters did correlate highly with non-matched clusters in addition to their matched clusters (see Table 4). These results as a whole support the assumption of stability in the OAI-based cluster structure.

The Kruskal-Wallis H Test was used to test for discriminability among the 21 macro clusters on each of the 102 OAI first-order factors. The results of this test showed statistically significant differences ($p < .01$) among the clusters on all 102 factors. It must be noted, however, that although the clusters as a whole were discriminable in terms of the profile variables, there were substantial profile similarities between some of the clusters. The intercorrelations among the 21 clusters' mean first-order factor-score profiles, or centroids, ranged from .05 to .85, with a median value of .37 (see Table 26, Appendix G). As examples, Macro Clusters 1 through 4 had substantial correlations ($r \geq .67$) with one another, as did Clusters 14 through 16. Macro Clusters 1, 2, 3, 5, and 6 had the largest number of moderate-to-substantial correlations ($r \geq .50$) with other clusters, averaging 10 such correlations each. (See Table 3 for the macro cluster titles.) However, the intercorrelations among the 21 cluster centroids should be compared with the correlations between the centroids of the matched subsample clusters obtained in the previously described stability analysis. The values of those latter correlations ranged from .65 to .99 with a median value of .90, considerably higher than the correlations among the 21 macro clusters, even though the subsample correlations were computed between centroids that were based on smaller sample sizes and were, therefore, presumably less stable. Although it cannot be indicated what degree of independence among the macro-cluster centroids would be reasonable or desirable, the results do show some systematic uniqueness, or specificity, in those mean factor-score profiles.

Meaningfulness of the Occupational Clusters

Based on the statistical results as summarized and discussed in the preceding section, it can be concluded that the macro clusters show moderate to substantial homogeneity, stability, and discriminability.

Statistical analyses alone cannot, however, determine the meaningfulness of the cluster structure. In initiating the study, the investigators had hoped that the derived structure might, with further development and refinement, provide a reasonable framework and some of the content for a proposed information system applicable to occupational exploration and guidance. In that regard, it was intended that a revised

set of OAI-based macro clusters might serve as the entry categories in the proposed system. Under such a system, the macro-cluster profiles on the OAI higher-order work dimensions (factors) would provide a comparative basis for the individual's profile on interest scales developed along those same dimensions (Cunningham, Slonaker, and Riegel, 1975); the individual could be referred to those macro clusters whose work-dimension profiles were most congruent with his/her activity-preference, or interest, profile. It was believed, moreover, that the micro clusters subsumed under the broader macro clusters might provide a more specific breakdown of the structure that would be useful in the envisaged occupational information system. Appendix I contains a brief description of the proposed system and its components.

Whether the occupational cluster structure obtained in this study can be developed into a useful framework is a question the investigators cannot answer directly at this time. At the very least, these results must be examined by a number of other specialists in occupational analysis, education, and guidance. If the present cluster structure were to survive such a review, then a further developed (second-stage) structure could be pilot tested as a framework for an occupational exploration and guidance system.

Despite the difficulty in determining the potential utility of an OAI-based cluster structure, some indication of the meaningfulness of the present cluster solution can be gleaned from comparisons with existing occupational classification schemes. Probably the best known and most used of the presently available classification systems is that developed by the U. S. Employment Service in organizing the Dictionary of Occupational Titles (U. S. Department of Labor, 1965). One part of the DOT system that seems a reasonable basis of comparison for the OAI cluster structure is the "Worker Traits Arrangement," comprising 22 "work areas" which, in turn, subsume a total of 103 "worker trait groups." Each worker trait group contains occupations assumed to be reasonably homogeneous in their human requirements--essentially the same premise underlying the OAI-based clusters. Although the DOT Worker Traits Arrangement was apparently rationally derived, it represents a large-scale effort on the part of some capable and experienced professionals in the field of occupational analysis.

A comparison of the two occupational structures involved an attempt to relate the 25 major OAI clusters to the 22 DOT work areas, based on the six-digit DOT code numbers of their respective constituent jobs (i.e., based on similarities in their job memberships). The results of that effort appear in Table 7, which lists the 25 major OAI clusters in the left-hand column and related DOT work areas in the right-hand column. As seen in this table, 11 of the OAI clusters relate to two or three different DOT work areas, while the remaining 14 clusters are matched with only one work area. The parenthesized titles accompanying some of the major work-area titles in Table 7 identify worker trait groups that were judged particularly relevant to the specified OAI clusters.

Table 7

Relationships Between the Twenty-Five Major OAI Clusters and the Twenty-Two Work Areas of the Dictionary of Occupational Titles

OAI Clusters	DOT Work Areas[a]
[b]1. High-Level Administrators and Managers	• Business Relations • Managerial and Supervisory Work
[c]2. Mid- and Lower-Level Administrators and Managers	• Managerial and Supervisory Work
[b]3. Educators, Advisors, and Counselors	• Education and Training • Counseling, Guidance, and Social Work
[b]4. Research and Data Processing/ Analysis Specialists and Managers	• Mathematics and Science • Engineering • (Also Business--Accounting, data processing)
[b]5. Writers	• Writing
6. Clerical Occupations	• Clerical Work
7. Sales and Customer Service Occupations	• Merchandising • Personal Service (Customer service; Misc. personal service)
8. Protective Service Occupations	• Law and Law Enforcement (Protecting & related; Investigating, protecting)
9. Material/Product Handling, Recording, and Inspecting Occupations	• Investigating, Inspecting, and Testing (Inspecting & stock checking; Sorting, inspecting, measuring; Clerical--checking & recording) • Elemental Work (Handling)
10. Occupations in Applied Physical Science and Technology	• Engineering • Mathematics & Science (Scientific research; Investigating, inspecting, testing--materials analysis)

Table 7 (continued)

OAI Clusters	DOT Work Areas[a]
11. Occupations in Electronic/ Electrical Equipment/ Systems Operation	• Photography and Communications (Radio and television transmitting)
12. Farming, Forestry and Other Botanically Related Occupations	• Farming, Fishing and Forestry
13. Health-Related Occupations	• Medicine and Health
14. Personal Service Occupations	• Personal Service
15. Occupations in the Performing Arts	• Entertainment • Music • Art (Entertainment & recreation)
16. Occupations in Visual Aesthetics	• Art
17. Occupations in Animal Care	• Personal Service (Animal Care) • Farming, Fishing & Forestry (Animal farming; Animal husbandry)
18. Occupations in Assembly and Fabrication	• Crafts (Manipulating; Precision work--fabrication & assembly) • Machine Work (Operating-controlling; Tending) • Elemental Work (Handling--fabrication & assembly)
19. Structural Work Occupations	• Crafts (Craftsmanship; Manipulating--fabrication, assembly, construction)
20. Mechanics and Stationary Machine/Equipment Repairers and Operators	• Machine Work (Set up, adjustment; Operating-controlling; Tending) • Crafts (Craftsmanship--mechanical repairing & other)
21. Occupations in Stationary Machine/Equipment Tending, Feeding, and Offbearing	• Machine Work (Operating-controlling; Tending; Feeding-offbearing)

Table 7 (continued)

OAI Clusters	DOT Work Areas[a]
22. Routine Object/Material Handling and Cleaning Occupations	• Elemental Work (Handling) • Crafts (Sorting; Manipulating)
23. Occupations in Mechanized Equipment and Vehicle Operation	• Machine Work (Driving-operating) • Transportation (Transportation service)
24. Electricians, Electronic Technicians and Related Occupations	• Crafts (Craftsmanship;Manipulating--electrical assembling, installation, repairing)
25. Occupations in Food Processing/Preparation	• Crafts (Cooking & related work; Supervisory work; Manipulating--food & beverage preparation)

[a]In cases where more than one DOT Work Area is related to an OAI cluster, the work-area titles are typed on separate lines (to the right of the OAI cluster title). Titles in parentheses refer to specific Worker Trait Groups within the indicated Work Areas. Where more than one worker trait group is identified for a work area, the trait-group titles are separated by semicolons.

[b]This title refers to a single micro cluster identified within the Organizational and Human Relations macro cluster.

[c]This title refers to a category of micro clusters identified within the Organizational and Human Relations macro cluster.

Although the two occupational structures are far from identical, reasonable relationships were found between the OAI clusters and DOT work areas in practically all cases. Moreover, each of the 22 work areas was judged to be related to at least one OAI cluster. The results of this judgmental analysis, along with the statistical analyses reported earlier, support the construct validity of the OAI clusters; that is, the major clusters appear to be both meaningful and comprehensive. These results might also be offered as further support for the validity of the OAI first-order factors upon which the clusters are based. (As indicated earlier, previous studies have supported the validity of the OAI factors, or work dimensions: Bates and Cunningham,

in press; Heath, Cunningham, and Augustin, 1975; Tuttle and Cunningham, 1974.) Reciprocally, the observed relationships might be claimed in support of the DOT work areas, in that a systematic study produced job groupings that were not altogether incompatible with those categories.

A feature of this study that distinguishes it from most efforts in occupational classification is the quantitative-inductive approach taken in deriving job groupings. To the writers' knowledge, the only other effort of this nature, size, and scope has been undertaken by E. J. McCormick and his associates at Purdue University (De Nisi and McCormick, 1974; Shaw, De Nisi, and McCormick, 1977), who have clustered large samples of jobs rated on the Position Analysis Questionnaire (PAQ) (McCormick, Jeanneret, and Mecham, 1969, 1972). McCormick et al.'s main objective in deriving their job clusters ". . . was that of ultimately using them as the possible basis for the establishment of aptitude requirements of individual jobs"; their secondary objective related to ". . . the possible use of the job clusters as the basis for the establishment of compensation rates for jobs" (De Nisi and McCormick, 1974). The statistics presented for the PAQ-based cluster solutions add to the already impressive body of data supporting the PAQ. At this writing, however, the OAI and PAQ cluster solutions cannot be compared, since the PAQ clusters were not titled or their constituent jobs identified in the cited reports. Nevertheless, it is likely that the necessary information for a comparison of the cluster structures can be obtained, and this would be a desirable first step in a future study of the OAI-based structure. Similarities between the OAI and PAQ cluster structures would add support to the construct validity of both systems; examination of the similarities and differences between the two structures could improve our understanding of the problems and processes involved in occupational taxonomy.

Future Research

The results of this study, though encouraging, represent only the first phase in the development of a valid and useful OAI-based occupational structure. Considerable revision, expansion, and elaboration of the cluster structure should precede its application to educational development.

The most feasible and reasonable sequel to the present study would involve re-clustering the existing sample of OAI-rated jobs by a non-hierarchical procedure, such as the BC-TRY program (Tryon and Bailey, 1970), which, unlike the CODAP procedure used in this study (see p. 9), allows clusters with overlapping memberships. In the cited study by De Nisi and McCormick (1974), the CODAP and BC-TRY programs were applied separately to the factor-score profiles of a large sample of jobs that had been rated on the Position Analysis Questionnaire. Unfortunately, the methods in the two cluster analyses cannot be compared directly, since they used different profile similarity indices (d^2 for

CODAP and correlation for BC-TRY). (As indicated in Appendix A, the results of preliminary research in the present study seem to show that the correlation coefficient produces a clearer cluster structure than the d^2 index when applied to job-rating data.) De Nisi and McCormick report that the BC-TRY program, using the correlation coefficient, produced the more meaningful of the two cluster structures. It cannot be determined, however, whether the difference should be attributed to the clustering procedure, the profile-similarity index, or both. Regarding the choice of a clustering procedure, Sokal (1974) maintains that classification schemes composed of overlapping categories seem more reasonable than those based on mutually exclusive categories, and that the former approach is gaining favor among taxonomists. Thus, it seems possible that application of the BC-TRY procedure to the existing OAI data would produce an improvement over the present cluster structure.

In addition to exploration with an alternative clustering procedure, future efforts toward developing an OAI-based classificatory system should employ a larger sample of jobs. As noted previously, some seemingly meaningful clusters, especially at the micro level, contained too few jobs to warrant confidence in their stability; yet, when those clusters were allowed to merge with others, the resultant groupings were usually too heterogeneous. It seems likely that a larger job sample, if representative of the entire job population, would yield a clearer and more differentiated cluster structure.

Future clustering results could also be improved through the use of job factor-score profiles based on multiple OAI ratings. If, for example, multiple OAI ratings were obtained for one-third of the jobs in the sample and averaged for each job, the resultant mean factor-score profiles for those jobs would be considerably more stable than those based on only one OAI rating (as was the case with the OAI profiles used in the present study). Consequently, the jobs whose profiles were based on multiple ratings should be more accurately clustered and would, accordingly, be given more consideration in the cluster interpretations.

A short form of the OAI (the OAI-SF), containing approximately one-third as many work elements (rating items) as the original form, is currently under development. This short form will increase the feasibility of large-scale data collection efforts, such as the aforementioned. Once a satisfactory cluster structure were established, jobs could subsequently be added to the system based on the relationships between their OAI-SF factor-score profiles and the centroids of the various occupational clusters.

As mentioned, comparisons between the OAI cluster structure and other occupational structures could provide support for the validity of the OAI and add to our understanding of the problems and processes involved in occupational taxonomy. Moreover, established linkages between the OAI and occupational frameworks currently in use (e.g., the DOT Worker Trait Areas and Groups) could add to the utility of the OAI system. The comparisons between clusters could be based on common job

memberships and on relationships among cluster centroids. The latter form of comparison might involve, for example: (a) obtaining OAI ratings on jobs contained in the occupational clusters (or categories) to be compared and computing the jobs' OAI factor-score profiles from the ratings; (b) computing the OAI centroid, or mean factor-score profile, for each cluster; and (c) computing intercorrelations among the various cluster centroids. Alternatively, a comparative analysis between the OAI and another quantitative system, such as that based on the Position Analysis Questionnaire (De Nisi and McCormick, 1974; McCormick, Jeanneret, and Mecham, 1972), could employ the other system's variables (e.g., PAQ factor scores) as the basis for comparison. Besides having highly correlated centroids, two "similar" clusters should draw the same new jobs from a common sample, based on correlations between individual job profiles and the cluster centroids (Orr, 1960).

It should be noted that in addition to providing a basis for comparing the OAI cluster structure with other occupational frameworks, the OAI work dimensions could be used to describe and quantify currently existing occupational classification schemes. Thus, jobs belonging to the various occupational categories comprising a selected scheme could be profiled on the OAI dimensions, and a mean OAI profile could be computed for each category. The resultant OAI profiles would provide a basis for assigning jobs to categories, comparing categories across different systems, and comparing the characteristics of occupational education programs (as analyzed by the OAI) with the requirements of various occupations and occupational categories. The OAI attribute-requirement estimates (Pass and Cunningham, 1975) comprise another set of variables that could prove useful as quantitative descriptors of occupations and occupational categories. As noted previously (pp. 2-3), the OAI attribute variables characterize jobs and occupations in terms of their requirements for various abilities, interests, and needs that are measured by existing tests and inventories.

Future research should also deal with the construct validity of the OAI cluster structure. Although the proposed cross-system cluster comparisons might lend some support to the OAI system--in addition to the support resulting from the reported cluster stability, homogeneity, and discriminability analyses--other kinds of analyses are needed. It should be expected, for example, that successful job holders' scores on various ability tests and on interest inventories would differ significantly among the OAI clusters, and that the directions of the differences could be predicted from the clusters' respective work-dimension and attribute-requirement profiles. Indeed, there are some limited data supporting that general hypothesis and demonstrating that the OAI work-dimension and attribute-requirement scores for jobs are significantly related to the test and inventory scores of job holders (Augustin, Cunningham, and Heath, 1975; Bates and Cunningham, in press; Cunningham, Phillips, and Spetz, 1976; Heath, Cunningham, and Augustin, 1975; Tuttle and Cunningham, 1974). The OAI clusters should also be expected to differ significantly and in predicted directions in terms of job variables from other description and classification systems, e.g., the trait

ratings of the U. S. Employment Service and the job-dimension scores of the Position Analysis Questionnaire (cf. Holland et al., 1970). These and other kinds of validity analyses should be pursued.

When the OAI cluster framework has reached some satisfactory stage of development, it would be desirable to elaborate the scheme down to a more specific descriptive level. Such an effort, as applied to a specified cluster, would involve (a) identifying the cluster's important OAI work dimensions, (b) identifying and enumerating more specific kinds of work activities (perhaps down as far as the task level) relevant to those important dimensions and characteristic of the jobs comprising the cluster, and (c) developing descriptive statements for the identified activities. The initial set of activity statements could be obtained from existing sources, such as U. S. Employment Service job schedules and the task-bank materials available from the Ohio State University Center for Vocational Education. From the initial pool, those activities that were common to large numbers of jobs within the cluster could be identified through the task-inventory procedure (cf. Morsh and Archer, 1967; Christal, 1970) or some less quantitative method, such as that employed by Maley (1966). If the task-inventory procedure were followed, the initial pool of activities might be used as profile variables in a cluster analysis designed to subdivide a relatively broad OAI cluster into a number of narrower, more specific clusters. As presently envisaged, the ultimate OAI cluster scheme would consist of a set of broad (or macro) occupational clusters which, in turn, would subsume a larger number of narrower and more specific (micro) clusters. In addition to their constituent micro-cluster and job titles, the macro clusters would be characterized by OAI work-dimension and attribute-requirement profiles, while the micro clusters would be characterized by constituent job titles, the OAI variables, and the more specific work activity statements. Under this scheme, the interlinked sets of descriptive variables might be arranged into the following human developmental progression: (1) basic cognitive abilities, motor abilities, and educational skills (represented by OAI attribute-requirement estimates); (2) general types of occupational capabilities, as represented by selected OAI work dimensions and estimates of general vocational capability requirements; and (3) classes of relatively advanced and focused proficiencies, as represented by the more specific work activity statements (cf. Cunningham et al., 1974). Realization of the proposed scheme would, of course, require a long-range effort.

Besides the aforementioned taxonomic research, efforts have been proposed to apply the OAI and its related variables and structure in the development of such products as interest scales, occupational capability tests, a curriculum analysis procedure, and an information system for use in occupational exploration and guidance (Cunningham, 1974b; Cunningham et al., 1974). A set of OAI-based interest scales has, in fact, been developed on an exploratory basis, as well as some prototype occupational exploration materials (Cunningham, Slonaker, and Riegel, 1975); the components of a proposed information system for use in occupational exploration and guidance are described briefly in Appendix I of this report.

Another effort, currently underway at the Ohio State University Center for Vocational Education, is employing the OAI attribute-requirement variables in the development of a system for "Relating the Capabilities of the Handicapped to the Human Attribute Requirements of Jobs" (McKinney, 1977; McKinney et al., 1977). The results of this development effort, although incomplete at this time, offer some promise for the utility of the OAI-based research.

An "ergometrically" developed occupational description and classification scheme, such as the OAI-based system, offers several advantages not often found in the more traditional taxonomic approaches. The OAI work dimensions and occupational clusters were derived through quantitative/inductive research procedures which, if carried out properly, should presumably produce a classification system that, in comparison to the traditional frameworks, is: (a) more representative of the existing job population, (b) less likely to be contaminated by preconceived notions, (c) based on a larger number of accountable variables, and, consequently, (d) more valid, or more isomorphic with the "real" world of work.[4,5] Several studies have, in fact, provided support for the validity of the OAI variables (Augustin, Cunningham, and Heath, 1976; Bates and Cunningham, in press; Cunningham, Phillips, and Spetz, 1976; Heath, Cunningham, and Augustin, 1976; Tuttle and Cunningham, 1974). Because the OAI variables (work elements, work dimensions, and attribute-requirement estimates) were designed explicitly to characterize jobs and occupations in terms of human requirements, the OAI system should be readily applicable in such human-resource-development areas as occupational exploration and guidance, occupational education curriculum evaluation and development, occupationally related testing, and job design for target populations (Cunningham et al., 1974). Moreover, because of their quantitative nature, the OAI variables and cluster structure are especially suited for incorporation into computerized information systems designed to describe, compare, and classify jobs, people, and occupationally related education and training programs.

At present, the OAI project is dormant for want of funds; its future is quite uncertain. A serious problem for this kind of research is the apparent lack of interest among funding sources in long-range, basic research efforts related to occupational education and guidance--as contrasted with relatively short-term projects promising some immediate impact. It is the writers' somewhat biased view, however, that

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[4]Sneath and Sokal (1973) discuss the advantages of numerical taxonomy (or taxometrics) over the non-quantitative approaches to classification.

[5]The taxometric approach to the description and classification of human work has been gaining advocates in recent years (Cunningham, 1974a; Hackman, 1968; Haggard, 1963; Shaw, De Nisi, and McCormick, 1977; Theologus, 1969).

over the long haul, the more basic and general efforts will prove at least as important as those designed for immediate application to specific problems. This is particularly true of occupational systematics, a relatively new field with potential application to a number of problems in occupational education.

In contrast to the field of biology, where several thousand scientists are working on taxonomic problems, occupational systematics can claim probably less than 100 participants, perhaps two dozen of whom have focused on educational problems. Yet, the importance of occupational taxonomy has been generally recognized for some time (Coombs and Satter, 1949; Fine, 1955; Jaspen, 1949; McCormick, Finn, and Scheips, 1957; Morsh and Ratliff, 1959; Shartle, 1946; Studdiford, 1951, 1953; Thorndike, 1953; Thorndike et al., 1957). More specifically, the need for taxonomic structure is widely acknowledged in the field of occupational education (Cunningham, 1969; Frantz, 1967; Maley, 1966; Sjogren and Sahl, 1966; U. S. Department of Health, Education, and Welfare, 1963). Recognition of this need was explicit in the U. S. Office of Education's attempt to devise an occupational cluster structure that would serve as a framework for the career education movement (Marland, 1971; National School Public Relations Association, 1971). However, an exclusively a priori logical approach is unlikely to produce an adequate classificatory system (Sokal, 1974), and it is doubtful that the USOE framework can carry the burden demanded of it.

In the absence of an adequate occupational taxonomy, considerable resources have gone into the development of materials, techniques, and experimental programs designed to articulate the educational system with a work domain that is only vaguely defined and understood. The field of occupational systematics has now progressed to the point, however, where such a situation is no longer necessary or defensible. Some relatively modest investments in systematic efforts to better describe and structure the world of work for educational purposes could pay large dividends.

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APPENDIX A

PRELIMINARY STUDY: EVALUATION OF PROFILE SIMILARITY INDICES AND FACTOR-SCORE ESTIMATION PROCEDURES FOR USE IN OAI-BASED JOB CLUSTERING

STATEMENT OF THE PROBLEM

An examination of the job-cluster solution obtained by Riccobono et al. (1975) identified two factors that might have attenuated the results: (a) the nature of the index used to determine similarities between job factor-score profiles and (b) the procedure used to compute the factor scores comprising the profiles. The study reported here was designed to evaluate different similarity indices and factor-score computation procedures for the purpose of clustering OAI-rated jobs. The study was conducted preliminary to a large-scale effort to cluster 1414 OAI-analyzed jobs.*

In connection with the first of the aforementioned attenuating factors, it was suspected that the OAI work-dimension (or factor) scores for jobs were influenced by the adaptation levels of the raters. Thus, raters could differ appreciably in their average OAI work-element ratings of the same jobs, and this, in turn, would introduce consistent inter-rater differences into the OAI work-dimension (factor) scores for those jobs. Such inter-rater differences would be confounded with "true" differences among jobs on the OAI work dimensions, since a large number of raters were involved in the OAI analyses of the 1414 jobs, and each job was, in most instances, analyzed by only one rater. If the rater adaptation-level effect does, in fact, enter heavily into the differences in work-dimension scores among jobs, it would seem advisable to use a profile similarity index that accounts for profile shape but does not reflect profile elevation. Accordingly, the preliminary study was designed, in part, to determine if similarity indices that relate profiles based primarily on their shape (e.g., the Pearson coefficient and cosine) would produce more meaningful occupational clusters from the OAI work-dimension profiles of jobs than would similarity indices that depend upon profile elevation (i.e., the various distance measures).

Regarding the second possibly attenuating factor, it was suspected that an "incomplete" method of estimating the OAI work-dimension (factor) scores for jobs might result in a more meaningful occupational cluster structure than the "complete" method of factor-score estimation used in the Riccobono et al. study. In the present study, the complete and incomplete methods of factor-score estimation are distinguished by whether they use all of the variables from a factor analysis (the complete method) or only a limited number of important, or salient, variables marking each factor (the two incomplete methods) (Horn, 1965). Since the OAI factors were interpreted based on the work elements that marked the factors with substantial loadings, it might be desirable to include only those salient work elements in estimating the factor scores for jobs. To use all of the work elements from a factor analysis in factor-score computation could result in non-zero factor scores for some jobs which would not be

*Part of this research is reported by Hamer (1977).

meaningful in terms of a factor's interpretation; i.e., a job could obtain a non-zero factor score from ratings on OAI work elements that were not considered in the factor's interpretation. Based on this rationale, it was decided that three different factor-score estimation procedures (one complete and two incomplete) would be compared in the preliminary study.

PROCEDURES AND RESULTS

Job Cluster and Similarity Criteria

One evaluation criterion in this study consisted of a set of six job clusters representing six Worker Trait Groups (WTG's) selected from the Dictionary of Occupational Titles (DOT) (U. S. Department of Labor, 1965). These occupational groups were used as an *a priori* cluster structure against which all subsequent OAI-based cluster solutions in the preliminary study were compared. The six WTG's were selected so as to represent some range in the occupational spectrum while, at the same time, providing a test for the OAI's power of resolution. Thus, based on the investigators' judgment, two pairs of somewhat similar WTG's were selected, along with two additional WTG's that were dissimilar from all the others. Fifty jobs were then selected from a sample of 1414 OAI-rated jobs to represent the six WTG's. These jobs were chosen based on an examination of their titles and DOT numbers, in comparison with the WTG's' constituent jobs as listed in the DOT. A list of the jobs selected for each of the six WTG's appears in Table 8. (Hamer [1976] presents a more detailed description of the procedure followed in selecting the WTG's and jobs.)

A second evaluation criterion consisted of a 50-by-50 matrix of job similarity estimates based on judges' ratings. Each of nine judges, all psychology graduate students, was given written descriptions (U. S. Employment Service job schedules) of the 50 aforementioned jobs, which they used in making pair-wise similarity judgments among the jobs on a nine-point scale ranging from "extremely similar" (indicated by a rating of "1") to "extremely dissimilar" (indicated by a rating of "9"). A 50-by-50 job similarity rating matrix was obtained for each judge with the aid of the Interactive Scaling with Individual Subjects System (Baker and Young, 1974). This computerized interactive procedure samples pair-wise similarity ratings from a judge and then, using these ratings as a model, estimates the remaining pair-wise ratings to produce a complete, symmetrical matrix of similarity ratings.

Inter-rater agreement analyses were carried out to determine if any judge's ratings deviated considerably from those of the other judges. These analyses consisted of correlating each judge's job similarity ratings with the mean job similarity ratings of the remaining judges. The

Table 8

Jobs Selected from Six Worker Trait Groups (WTG's)

Observation	Job Title	DOT Code	ID
WTG I:	Jobs from the Information Gathering, Dispensing, Verifying, and Related Work WTG		
1	Hotel Clerk	242.368	24
2	Receptionist	237.368	23
3	Hotel Clerk	242.368	16
4	Information Desk Clerk	273.368	32
5	Clerk Aide	237.368	34
6	Clerk Typist	243.368	36
7	Reservations Supervisor	242.368	38
8	Assistant Reservations Manager	242.368	40
9	Customer Service Clerk	241.368	42
WTG II:	Jobs from the Managerial Work WTG		
1	Communications Eleftrician Foreman	184.168	28
2	Avionics Foreman	184.168	29
3	Chief Inspector	184.168	30
4	Steam Plant Economy Control Supervisor	184.168	31
5	Manager, Loss Prevention	184.168	35
6	Superintendent (Maintenance	184.168	37
7	Director, General Aviation	184.168	39
8	General Plant Manager	184.168	41
WTG III:	Jobs from the Set Up and/or All-Round Machine Operation WTG		
1	Machine Operator A	600.380	3
2	Tool and Die Maker	601.280	4
3	Turret Lathe Operator	604.280	5
4	Boring-Mill Machinist	606.280	6
5	Fabricator, A-Cutting Department	619.380	8
6	Machinist	600.280	18
7	Pipe Making Welder	616.380	20
8	Production Mechanic, Tin Cans	619.380	26
9	Screw Machine Set-Up Operator, Jobbing	604.380	27
WTG IV:	Jobs from the Tending WTG		
1	Punch Press Operator	617.885	7
2	Four Slide Operator	619.885	9
3	Corner Cutter	640.885	10
4	Sealing Machine Operator	641.885	11
5	Machine Operator B	609.885	19

Table 8 (continued)

Observation	Job Title	DOT Code	ID
6	Box Machine Operator	641.885	21
7	Printer Bagging Machine Operator	649.885	22
8	Rewinder Operator	640.885	33
WTG V:	Jobs from the Computing and Related Recording WTG		
1	Accounts Payable Clerk	219.488	17
2	Account Clerk I and II	219.488	25
3	Labor Analysis Clerk	219.488	44
4	Power Load Records Clerk	219.488	45
5	Monthly Report Clerk	219.488	46
6	Accounting Clerk B	219.488	47
7	Accounting Clerk A	219.488	48
8	Billing Clerk I - Source Document Verifier	219.488	50
WTG VI:	Jobs from the Nursing, X-Ray, and Related Services WTG		
1	Director of Nurses	C75.378	1
2	Bio-Instrumentation Technician	078.368	2
3	Dental Hygienist	078.368	12
4	X-Ray Technologist	078.368	13
5	Inhalation Therapy Technician, Therapist, Supervisor	079.368	14
6	Desk Aide (Medical Service)	079.368	15
7	Industrial Nurse	075.368	43
8	E.E.G. Technician	078.368	49

results of this procedure, presented in Table 9, led to the decision to eliminate two raters who obtained very low correlation coefficients. The overall reliability for the ratings of the remaining seven judges was determined by applying a repeated-measures analysis of variance procedure (Winer, 1971), in which judges comprised the "treatment" variable, pairs of jobs were the cases on which repeated measures were made, and pair-wise similarity ratings were the dependent variable (cell entries). The unadjusted reliability coefficient for the mean of seven raters obtained with this procedure equaled .837. The ratings of the seven judges were then averaged to produce a mean judgment matrix, which served as the second evaluation criterion in this study.

Table 9

Correlations of the Individual Judges' Similarity Rating Matrices with Mean Similarity Matrices Calculated from the Remaining Judges' Ratings

Raters								
1	2	3	4	5	6	7	8	9
.708	.673	.884	.926	.901	-.119[a]	.891	.144[a]	.377

[a]These judges' ratings were not included in the calculation of the average judgment matrix used in subsequent analyses.

The Job Profile Variables

The 50 jobs in this study were profiled on 102 OAI first-order factors selected from the 132 factors derived by Boese and Cunningham (1976) from the OAI ratings of 1414 jobs. Of the original 132 factors, those derived from the General Physical Requirements and Work Context sections of the OAI, as well as certain factors that were not considered meaningful, were eliminated for purposes of the present study. A list of the remaining 102 factors was presented in Table 2 (pp. 11-13). The factor scores comprising the job profiles were computed by Incomplete Method I, described later in the report of this study (see Table 16).

Evaluation of Seven Profile Similarity Indices

Table 10 presents the names and formulas of the seven profile similarity indices evaluated in this study. Seven 50-by-50 job similarity matrices were derived by applying each of these indices separately to the OAI factor-score profiles of the 50 jobs in the sample.

Correlations Among Similarity Matrices

As mentioned, one criterion used in evaluating the seven profile similarity indices was the matrix of mean judges' pair-wise job similarity ratings. Accordingly, the entries in the job similarity matrix derived by each of the seven profile indices were correlated with the corresponding entries in the mean judged similarity matrix. In addition, the seven profile-based similarity matrices were correlated with each other. Tables 11 and 12 present, respectively, the intercorrelations between (a) the seven profile-based matrices and (b) the profile-based matrices and the criterion matrix. Of particular interest for the

Table 10

Formulae for the Seven Different Similarity Indices

Similarity Index	Formula
Euclidean Distance:	$D_{ij} = \sum_{k=1}^{p} \left\lvert X_{ik} - X_{jk} \right\rvert$
Euclidean Distance Squared:	$D_{ij}^2 = \sum_{k=1}^{p} (X_{ik} - X_{jk})^2$
Product-Moment Correlation:	$r_{ij} = \dfrac{p \sum_{k=1}^{p} (X_{ik}X_{jk}) - (\sum_{k=1}^{p} X_{ik})(\sum_{k=1}^{p} X_{jk})}{\sqrt{p \sum_{k=1}^{p} X_{ik}^2 - (\sum_{k=1}^{p} X_{ik})^2}\ \sqrt{p \sum_{k=1}^{p} X_{jk}^2 - (\sum_{k=1}^{p} X_{jk})^2}}$
Average Non-Zero Distance:	Same as Euclidean Distance except pairs of zero scores on X_{ik} and X_{jk} were excluded, and D_{ij} was divided by the number of non-zero X_{ik} and X_{jk} pairs.
Cosine:	$C_{ij} = \dfrac{\sum_{k=1}^{p} (X_{ik}X_{jk})}{\sqrt{(\sum_{k=1}^{p} X_{ik}^2)(\sum_{k=1}^{p} X_{jk}^2)}}$

Table 10 (continued)

Similarity Index	Formula
Absolute Time Overlap[a]:	$O_{aij} = \sum_{k=1}^{p} \text{minimum } (X_{ik}, X_{jk})$
Percent Time Overlap[a]:	$O_{ij} = \sum_{k=1}^{p} \text{minimum } (X^{*}_{ik}, X^{*}_{jk})$

where: D_{ij}, D^2_{ij}: distance between i^{th} and j^{th} elements (jobs)

r_{ij}, O_{aij}, O_{ij}: similarity between i^{th} and j^{th} elements (jobs)

P: number of variables in profile

K: any one of the p variables

X_{ik}, X_{jk}: the score values of elements (jobs) i and j on variable K

X^{*}_{ik}, X^{*}_{jk}: the standardized score values of elements (jobs) i and j on variable K

[a]The Absolute Time Overlap is a modification of the Percent Time Overlap Index from the CODAP/Profile Analysis System developed by the AFHRL Personnel Research Division of Lackland Air Force Base, Texas.

Table 11

Correlations Between Similarity Matrices Derived from the Application of Different Similarity Indices to the OAI Factor-Score Profiles of 50 Jobs

Similarity Index	Similarity Index[a]						
	Euclidean Distance	Euclidean Distance Squared	Cosine	Correlation	Average Non-Zero Distance	Absolute Overlap	Percent Overlap
Euclidean Distance	1.000	.973	.534	.633	.613	-.276	.452
Euclidean Distance Squared		1.000	.435	.531	.566	-.294	.369
Cosine			1.000	.979	.398	.397	.954
Correlation				1.000	.389	.248	.900
Average Non-Zero Distance					1.000	.124	.365
Absolute Overlap						1.000	.520
Percent Overlap							1.000

[a]For a description of the different indices, see Table 10.

Table 12

Correlation Between the Matrix of Average Judged Similarities Among 50 Jobs and Similarity Matrices Derived from the Application of Different Similarity Indices to the OAI Factor-Score Profiles of the 30 Jobs[a]

	Euclidean Distance	Euclidean Distance Squared	Cosine	Correlation	Average Non-Zero Distance	Absolute Time Overlap	Percent Time Overlap
Mean Judged Similarities Matrix	.329	.235	.717	.702	.343	.368	.698

[a]Factor scores were calculated by an incomplete factor score estimation method,

$$F_{ik} = \frac{\sum_{j=1}^{M_k} (L_{jk}R_{jk})}{M_k}$$

where: F_{ik}: the factor score for the i^{th} job on factor K,

L_{jk}: the Fisher Z transformation of the j^{th} item loading which has a value $\geq .30$ on the interpreted pole of factor K,

R_{jk}: the j^{th} item rating on factor K that corresponds to L_{jk}, and

M_k: the number of item loadings $\geq .30$ on the interpreted pole of factor K.

present study is the finding that the similarity matrices based on indices that are not sensitive to profile elevation (i.e., correlation, cosine, and percent overlap) correlated higher with the criterion matrix than did the matrices containing indices that do account for profile elevation (i.e., the distance indices and absolute overlap).

Comparisons of Cluster Analysis Solutions with the Six Selected Worker Trait Groups

The six previously described Worker Trait Groups (WTG's) comprised the second criterion for evaluating the seven profile similarity indices. Preparatory to the evaluation by this criterion, a hierarchical clustering procedure was applied separately to the seven job-similarity matrices based on the different profile indices, as well as to the matrix based on mean judges' similarity ratings. (The hierarchical clustering procedure is described on p. 9 of this report.) Each of the eight resultant cluster solutions was then compared to the set of WTG's to determine how closely the solution matched the WTG structure. A comparison was accomplished by (a) identifying judgmentally the set of clusters in the obtained hierarchical solution that most closely resembled the six WTG's, and then (b) counting the number of misplaced jobs in those identified clusters--that is, the number of jobs belonging to the same WTG's that did not belong to the same clusters in the obtained solution. In cases where the jobs from a particular WTG were divided into two separate clusters, the jobs in the smaller cluster were counted as misplaced. If an identified cluster contained jobs from two or more WTG's, then only the largest number of jobs from the same WTG were considered to be properly placed, while the remaining jobs in the cluster were counted as misplaced.

The results of the comparisons between clusters and WTG's are presented in Table 13. As shown, the cluster solutions based on similarity indices that are not sensitive to profile elevation (i.e., correlation, cosine, and percent overlap) contained fewer misplaced jobs than those based on indices that do account for profile elevation (i.e., the distance indices and absolute overlap). The best solution, however, was produced by the mean judged similarity matrix, a finding that supports this matrix's use as a criterion for evaluating the seven profile similarity indices. Table 14 presents the cluster solution based on the mean similarity judgments.

Comparisons of Factor-Score Computation Procedures

Two "incomplete" methods and one "complete" method of factor score computation were compared in this study. For that purpose, factor-score profiles were derived for each of the 50 jobs in the sample by each of the three computational procedures; i.e., three

Table 13

Number of Jobs That Failed To Be Placed into the Proper WTG as a Result of the Cluster Analysis of the Mean Judged Similarities Among 50 Jobs and Similarity Matrices Derived from the Application of Different Similarity Indices to the OAI Factor-Score Profiles of the 50 Jobs

	Judged Similarities	Euclidean Distance	Euclidean Distance Squared	Cosine	Correlation	Average Non-Zero Distance	Absolute Time Overlap	Percent Time Overlap
Number of Jobs Misplaced	2	15	15	7	8	15	25	13

Table 14

Job Clusters Identified from the Cluster Analysis of the Matrix of Average Judged Similarities Among 50 Jobs

Observation	WTG Membership	Job Title	DOT Code	ID
		Cluster 1		
1	I	Hotel Clerk	242.368	24
2	I	Assistant Reservations Manager	242.368	40
3	I	Reservations Supervisor	242.368	38
4	I	Hotel Clerk	242.368	16
5	I	Information Desk Clerk	273.368	32
6	I	Receptionist	237.368	23
7	I	Customer Service Clerk	241.368	42
		Cluster 2		
1	II	Communications Electrician Foreman	184.168	28
2	II	Avionics Foreman	184.168	29
3	II	Superintendent (Maintenance)	184.168	37
4	II	Director, General Aviation	184.168	39
5	II	Manager, Loss Prevention	184.168	35
6	II	General Plant Manager	184.168	41
7	II	Chief Inspector	184.168	30
8	II	Steam Plant Economy Control Supervisor	184.168	31
		Cluster 3		
1	III	Turret Lathe Operator	604.280	5
2	III	Boring-Mill Machinist	606.280	6
3	III	Screw Machine Set-Up Operator, Jobbing	604.380	27
4	III	Pipe Making Welder	616.380	20
5	III	Machine Operator A	600.380	3
6	III	Machinist	600.280	18
7	III	Production Mechanic, Tin Cans	619.380	26
8	III	Tool and Die Maker	601.280	4
9	III	Fabricator, A-Cutting Department	619.380	8

Table 14 (continued)

Observation	WTG Membership	Job Title	DOT Code	ID
		Cluster 4		
1	IV	Four Slide Operator	619.885	9
2	IV	Corner Cutter	640.885	10
3	IV	Box Machine Operator	641.885	21
4	IV	Sealing Machine Operator	641.885	11
5	IV	Rewinder Operator	640.885	33
6	IV	Punch Press Operator	617.885	7
7	IV	Printer Bagging Machine Operator	649.885	22
8	IV	Machine-Operator B	609.885	19
		Cluster 5		
1	V	Power Load Records Clerk	219.488	45
2	V	Billing Clerk I - Source Document Verifier	219.488	50
3	V	Accounting Clerk B	219.488	47
4	V	Accounts Payable Clerk	219.488	17
5	V	Monthly Report Clerk	219.488	46
6	V	Account Clerk I and II	219.488	25
7	V	Labor Analysis Clerk	219.488	44
8	V	Accounting Clerk A	219.488	48
9	I	Clerk Aide	237.368	34
10	I	Clerk Typist	243.368	36
		Cluster 6		
1	VI	Director of Nurses	075.378	1
2	VI	X-Ray Technologist	078.368	13
3	VI	Dental Hygienist	078.368	12
4	VI	Inhalation Therapy Technician, Therapist, Supervisor	079.368	14
5	VI	E.E.G. Technician	078.368	49
6	VI	Bio-Instrumentation Technician	078.368	2
7	VI	Desk Aide (Medical Service)	079.368	15
8	VI	Industrial Nurse	075.368	43

factor-score profiles were computed for each job. Each profile contained a job's scores on the 102 previously mentioned OAI first-order factors (see Table 2, pp. 11-13).

Under the two incomplete methods of factor score estimation, only OAI items (work elements) with loadings of .30 or higher contributed to a factor score. Incomplete Estimation Method I involved multiplying the Fisher Z transformations of the salient factor loadings by the corresponding OAI item ratings and computing the mean of those cross-products. A factor score under Incomplete Estimation Method II equaled the mean of the job ratings on the salient OAI items. This latter procedure modifies a method described by Horn (1965) by taking the mean rather than the sum of the item ratings in order to allow score comparisons across factors. Since all factors were treated as unipolar under both incomplete estimation methods, neither procedure involved negative values. (Strong bipolar factors were not included among the 102 factors chosen for this study; where both positive and negative loadings of .30 or higher did occur in a selected factor, only the items marking the most heavily loaded pole were used in estimating the factor score.) The formulas for the two incomplete factor-score estimates can be seen at the bottom of Table 16 later.

The complete method of factor score computation used all of the OAI items from each factor analysis in computing scores on the factors derived from that analysis. This procedure, which weighted each OAI item by its factor coefficient, was carried out by the BMDX-72 factor analysis program of the Biomedical Computer Programs (Dixon, 1970).

Correlations Between the Three Types of Factor Scores

For each of the 102 selected OAI work dimensions, Pearson product-moment correlations were computed between the three sets of factor scores for the sample of 50 jobs. Table 15 presents the results. The median correlation between the two incomplete methods was .99, while the median correlations of Incomplete Methods I and II with the complete method were .74 and .68, respectively.

Correlations Between Job Similarity Matrices Based on the Three Different Methods of Factor Score Estimation

Three 50-by-50 job similarity matrices were compiled from the intercorrelations among the jobs' factor-score profiles as computed by the three aforementioned factor-score estimation procedures. The entries in each of the three resultant matrices were then correlated with the corresponding entries in the other two matrices, i.e., the three job similarity matrices were intercorrelated. The results, as shown in

Table 15

Correlation Coefficients Between 102 OAI Factor-Score Distributions Calculated by Three Different Factor-Score Estimation Methods for a Sample of 50 Jobs[a,b]

Factor Number	Incomplete Method I vs. Incomplete Method II	Complete Method vs. Incomplete Method I	Complete Method vs. Incomplete Method II
1	.99	.95	.95
2	.98	.87	.80
3	.99	.99	.99
4	.99	.96	.96
5	.90	.85	.68
6	.99	.96	.95
7	.99	.93	.90
8	.99	-.78	-.73
9	.99	-.82	-.79
10	0.00	0.00	0.00
11	.98	.88	.86
12	.99	-.25	-.22
13	.99	---[c]	---[c]
14	.99	---[c]	---[c]
15	.95	.23	.24
16	.99	-.97	-.97
17	.99	-.76	-.77
18	.99	.90	.89
19	.99	.54	.53
20	.99	.49	.47
21	.99	.90	.89
22	.99	.98	.97
23	.97	.86	.76
24	.98	.90	.82
25	.99	.64	.63

Table 15 (continued)

Factor Number	Incomplete Method I vs. Incomplete Method II	Complete Method vs. Incomplete Method I	Complete Method vs. Incomplete Method II
26	.99	.44	.40
27	.99	-.77	-.74
28	.98	.72	.70
29	.99	-.69	-.68
30	.99	.98	.97
31	.93	.87	.71
32	.99	.99	.97
33	.99	.89	.88
34	.96	.70	.56
35	.99	.22	.21
36	.99	.85	.83
37	.99	.90	.87
38	.99	.69	.67
39	.99	.95	.93
40	.98	.94	.93
41	.99	-.89	-.88
42	.99	.86	.86
43	0.00	0.00	0.00
44	1.00	-.37	-.37
45	0.00	0.00	0.00
46	.99	-.61	-.62
47	.99	.80	.77
48	.99	-.78	-.77
49	.94	-.51	-.49
50	.99	-.67	-.62
51	.98	.50	.39
52	0.00	0.00	0.00
53	1.00	-.44	-.44

Table 15 (continued)

Factor Number	Incomplete Method I vs. Incomplete Method II	Complete Method vs. Incomplete Method I	Complete Method vs. Incomplete Method II
54	.99	.65	.64
55	.99	-.90	-.89
56	.99	.65	.62
57	.97	.76	.73
58	.98	-.83	-.72
59	.99	.93	.88
60	.89	-.87	-.64
61	.99	.81	.81
62	.99	-.95	-.94
63	.98	.85	.79
64	.99	-.74	-.73
65	.99	.92	.91
66	.99	.76	.70
67	.99	-.78	-.75
68	.99	-.58	-.55
69	.99	.74	.73
70	.99	.98	.97
71	.98	.91	.83
72	.99	.98	.96
73	.98	.95	.93
74	.94	.48	.40
75	.99	.98	.98
76	.98	-.92	-.92
77	.97	.05	-.06
78	.99	.76	.76
79	1.00	-.59	-.59
80	.99	.95	.92

Table 15 (continued)

Factor Number	Incomplete Method I vs. Incomplete Method II	Complete Method vs. Incomplete Method I	Complete Method vs. Incomplete Method II
81	.99	.98	.98
82	1.00	.13	.13
83	.99	.99	.99
84	.95	.83	.67
85	.93	.02	.03
86	.99	.95	.93
87	.98	.82	.75
88	1.00	.97	.97
89	.99	.89	.87
90	1.00	.09	.09
91	0.00	0.00	0.00
92	.98	.80	.73
93	.98	-.80	-.76
94	0.00	0.00	0.00
95	.97	-.92	-.87
96	1.00	.38	.38
97	.98	.80	.74
98	.98	.84	.78
99	.99	.93	.93

Table 15 (continued)

Factor Number	Incomplete Method I vs. Incomplete Method II	Complete Method vs. Incomplete Method I	Complete Method vs. Incomplete Method II
100	.98	-.93	-.90
101	1.00	.86	.86
102	1.00	.35	.35

[a]For a description of the three different methods, see Table 16. For a list of the 102 factor titles, see Table 2.

[b]On factors where all 50 jobs received a zero factor score, a "0.00" coefficient was assigned.

[c]Factors 13 and 14 were derived from one bipolar factor calculated with the complete estimation procedure. This bipolar factor was not compared to factors 13 and 14.

Table 16, are similar to those based on the factor-score intercorrelations (Table 15): the matrices based on the two incomplete methods correlated more highly with each other than with the matrix based on the complete method, and Incomplete Method I correlated more highly with the complete method than did Incomplete Method II.

Correlations of the Job Similarity Matrices Based on OAI Factor-Score Estimates with the Similarity Matrix Based on Judges' Ratings

Correlations were also computed between each of the three job similarity matrices derived from the OAI factor-score estimates and the criterion matrix based on judges' job similarity ratings. The correlations between the criterion matrix and the matrices based on Incomplete Methods I and II were .70 and .67, respectively. The correlation between the criterion matrix and the matrix based on complete factor scores was .72.

Comparisons Between the Job Clusters Based on the Three OAI Factor-Score Estimates and the WTG Structure

The six Worker Trait Groups provided another criterion for evaluating the three factor-score estimation procedures. Preliminary to that evaluation, the previously described hierarchical clustering procedure was applied separately to the job similarity matrices based on the three factor-score procedures. Each of the three resultant cluster structures was then compared with the WTG structure by the procedure described earlier for the evaluation of the various profile-similarity indices. Those comparisons showed little difference among the three solutions. The solutions based on the complete method and Incomplete Method II each contained seven misplaced jobs in relation to the WTG structure, while that based on Incomplete Method I contained eight misplaced jobs.

Examination of Factor-Score Distributions Generated by the Three Factor-Score Estimation Procedures

In the final part of the preliminary study, the three estimation procedures were used in computing scores for 1414 jobs on 10 selected OAI factors, and the scores on each factor were rank-ordered under each procedure. (The job sample is described on pp. 6-7 of this report.) The investigators then inspected the three resultant sets of factor-score rankings for apparent reasonableness; i.e., to determine whether the high, middle, and low scores on specified factors seemed "reasonable"

Table 16

Correlations Between Job Inter-Correlation Matrices Based on Different Methods of Estimating Factor Scores

Factor-Score Estimation Method	Factor-Score Estimation Method[a]		
	Incomplete Estimation Method I	Incomplete Estimation Method II	Complete Estimation Method
Incomplete Estimation Method I	---	.972	.808
Incomplete Estimation Method II		---	.776
Complete Estimation Method			---

[a] Incomplete Estimation Method I: $F_{ik} = \frac{\sum_{j=1}^{M_k} (L_{jk}R_{jk})}{M_k}$, and

Incomplete Estimation Method II: $F_{ik} = \frac{\sum_{j=1}^{M_k} UR_{jk}}{M_k}$, where:

F_{ik}: the factor score for the i^{th} job on factor K,

L_{jk}: the Fisher Z transformation of the j^{th} item loading which has a value $\geq .30$ on the interpreted pole of factor K,

R_{jk}: the j^{th} item rating on factor K that corresponds to L_{jk},

M_k : the number of item loadings $\geq .30$ on factor K, and

U : the constant, 1.

Complete Estimation Method: the calculation of factor scores was based on the procedure used in the BMDX-72 factor analysis program of the Biomedical Computer Programs, University of California Press, Berkeley, California, 1970.

in relation to the corresponding job titles. This comparative (and subjective) examination revealed no major differences in the three sets of ranked scores, except for the occurrence of zero values, which were much more prevalent under the two incomplete methods. In most cases where zero values occurred, the factors appeared to be irrelevant to the jobs in question.

Summary and Conclusions

This study was designed to evaluate seven different profile similarity indices and three factor-score computation procedures for use in clustering OAI-rated jobs.

The Profile Similarity Indices

The results of the comparative analyses of the seven profile similarity measures can be summarized as follows:

(1) Job similarity matrices based on indices that are not sensitive to profile elevation (i.e., correlation, cosine, and percent overlap) correlated higher with a criterion matrix than did the matrices containing similarity measures that do account for profile elevation (i.e., the distance indices and absolute overlap).

(2) Job cluster solutions based on similarity indices that are not sensitive to profile elevation contained fewer misplaced jobs (in relation to a criterion cluster structure) than solutions based on indices that do account for profile elevation.

(3) The Pearson product-moment correlation and the cosine performed best and about equally well in relation to the above mentioned criteria. Not surprisingly, these two indices correlated highly with each other.

The Factor-Score Computation Procedures

The results of the comparisons among three factor-score computation procedures were essentially as follows:

(1) The median correlation between factor scores based on the two incomplete methods was high (.99), while the median correlations of the complete method with the two incomplete methods were only moderate (.74 and .68 with Incomplete Methods I and II, respectively). Similar results were obtained when job similarity matrices based on the three types of factor scores were intercorrelated.

(2) There was little difference in the correlations between a criterion job-similarity matrix and similarity matrices based on the three factor-score computation procedures.

(3) There was little difference among job-cluster solutions based on the three types of factor scores in terms of numbers of misplaced jobs (in relation to a criterion cluster structure).

(4) Sets of ranked factor scores computed by the incomplete methods contained considerably more zero values than the set of complete factor scores. The increase in the number of zero values was considered desirable, since, in most such cases, the factors appeared to be irrelevant to the jobs in question. Other than the difference in occurrence of zero values, there was no discernible difference in the "reasonableness" of the three sets of factor scores.

Conclusions

The following decisions were made based on this preliminary study:

(1) The Pearsonian correlation and cosine were clearly superior to the other profile similarity indices in replicating the criterion job-similarity matrix and job-cluster structure. The Pearson coefficient was chosen over the cosine for future OAI-based job clustering because of its convenience and conventionality.

(2) The three types of factor scores performed about equally well in relation to the criterion job-similarity matrix and job-cluster structure. However, factor scores computed by the two incomplete methods seemed somewhat more meaningful than the complete factor scores, because the incomplete methods assigned considerably more zero values to jobs to which the factors in question appeared irrelevant. Incomplete Method II was selected for subsequent use in OAI job clustering, based on the foregoing consideration and on its computational simplicity.

APPENDIX B

PROFILE VARIABLES FOR 1414 JOBS

Table 17. Titles of 38 Content-Related, First-Order Work Dimensions (Factors) Used as Profile Variables for 1414 Jobs

Table 18. Titles of 117 First-Order Work Dimensions (Factors) Used as Profile Variables for 1414 Jobs

Table 17

Titles of 38 Content-Related, First-Order Work Dimensions (Factors) Used as Profile Variables for 1414 Jobs

Factor Number	Factor Titles Presented Under OAI Section Titles
	Information Received
1	Electrical and electronic information
2	Business-related numerical information
3	Biological and health information
4	Environmental information
5	Visual arts information
6	Information from machines
7	Materials information
8	Spatial/structural/mechanical information
9	Information related to people and human behavior
10	Performing arts information
11	Structure and format of written information
12	Information related to animals
[a]13	Abstract mechanical information
[a]14	Direct structural/mechanical information
15	Food information
16	Indirect environmental information
17	Direct business/sales information
18	Physical science and technology information
19	Direct-contact information pertaining to the appearance, poise, and physical capabilities of people
20	Difficulty of numerical information
	Work Goals
21	Botanical objectives
22	Technical planning/drawing objectives
23	Human behavior objectives
24	Environmental maintenance and planning objectives
25	Editing, proofing, and clerical objectives
26	Meteorological and astronomical objectives
27	Objectives related to animals
28	Organizational performance objectives
29	Material treatment/modification objectives
30	Performing arts objectives
31	Structural objectives
32	Terrain/earth planning and communication objectives
33	Sales and public relations objectives
34	Material handling/arrangement objectives
35	Electrical/electronic planning and communication objectives

Table 17 (continued)

Factor Number	Factor Titles Presented Under OAI Section Titles
	Work Goals (continued)
36	Assembly/fabrication objectives
37	Terrain/earth modification and maintenance objectives
38	Biological/health inspection objectives

[a]This "factor" consists of OAI items that loaded on one of the interpreted poles of a bipolar factor.

Table 18

Titles of 117 First-Order Work Dimensions (Factors) Used as Profile Variables for 1414 Jobs[a]

Factor Number	Factor Titles Presented Under OAI Section Titles
	Information Received
1	Electrical and electronic information
2	Business-related numerical information
3	Biological and health information
4	Environmental information
5	Visual arts information
6	Information from machines
7	Materials information
8	Spatial/structural/mechanical information
9	Information related to people and human behavior
10	Performing arts information
11	Structure and format of written information
12	Information related to animals
[b]13	Abstract mechanical information
[b]14	Direct structural/mechanical information
15	Food information
16	Indirect environmental information
17	Direct business/sales information
18	Physical science and technology information
19	Direct-contact information pertaining to the appearance, poise, and physical capabilities of people
20	Difficulty of numerical information
	Mental Activities
21	Semantic thinking
22	Figural information processing
23	Numerical and symbolic thinking
24	Routine symbolic and semantic information processing: clerical activities
25	Aesthetic/figural creativity
26	Associational fluency
27	Behavioral perception
28	Memory
29	Semantic problem detection and comprehension
	Physical Work Behavior
30	Removing material using stationary machines
31	Earth working and care/harvesting of plant life
32	Medical treatment

Table 18 (continued)

Factor Number	Factor Titles Presented Under OAI Section Titles
33	Repair and maintenance of machines and equipment
34	Combining and separating chemicals and other substances and materials
35	Building/repairing wooden structures and products
36	Fiber/thread working
37	Driving/operating vehicles and mechanized equipment
38	Surface Finishing
39	Use of scientific and measuring devices/instruments
40	Operating material-joining equipment
41	Tending/feeding/offbearing stationary machines
42	Material forming
43	Use and handling of sporting equipment
44	Processing food materials
45	Working on the interiors and exteriors of buildings
46	Use of handling, holding, and supporting devices
47	Bonding, stitching, and fastening with portable powered tools
48	Measuring/inspecting physical characteristics
49	Applying heat and pressure to materials
50	Bonding, coating, and related activities using hand tools
51	Using foot-operated settings and controls
[c]52	Liquid application/coating
53	Working with animals
54	Abrading, shaping, cutting, and fusing with powered tools/ equipment
55	Testing and repairing electrical/electronic equipment
56	General assembling activities
57	Routine cleaning and object handling activities
	<u>General Physical Requirements</u>
58	Arm, hand, and finger coordination and dexterity
59	Dynamic strength/endurance
60	Balance and body coordination
61	Tracking
62	General body and arm/hand strength
63	Climbing/kneeling/stooping/crawling
	<u>Representational Work Behavior</u>
64	Verbal communication: speaking and writing
65	Clerical activities
66	Drafting and drawing
67	Electronic data processing
68	Communication by visual signals and auditory codes

Table 18 (continued)

Factor Number	Factor Titles Presented Under OAI Section Titles
69	Using visual and audio-visual equipment
70	Using written codes
71	Using keyboard and other office equipment
72	Performing numerical operations
73	Analyzing and synthesizing information
74	Recording information in writing
75	Using voice transmission devices
	Interpersonal Work Behavior
76	Organizing and supervising the work of others
77	Resolving conflicts
78	Serving/assisting
79	Being supervised
80	Instructing
81	Treating
82	Obtaining and giving information
83	Persuading
84	Entertaining/socializing
85	Assisting superiors
	Work Goals
86	Bookkeeping objectives
87	Electrical/electronic function objectives
88	Botanical objectives
89	Biological/health objectives
90	Technical planning/drawing objectives
91	Visual aesthetics objectives
92	Mechanical function objectives
93	Human behavior objectives
94	Environmental maintenance and planning objectives
95	Editing, proofing, and clerical objectives
96	Meteorological and astronomical objectives
97	Objectives related to animals
98	Organizational performance objectives
99	Material treatment/modification objectives
100	Performing arts objectives
101	Structural objectives
102	Terrain/earth planning and communication objectives
103	Sales and public relations objectives
104	Material handling/arrangement objectives
105	Electrical/electronic planning and communication objectives
106	Assembly/fabrication objectives

Table 18 (continued)

Factor Number	Factor Titles Presented Under OAI Section Titles
107	Terrain/earth modification and maintenance objectives
108	Biological/health inspection objectives
	Work Context
109	Incentives
110	Physical hazards and discomforts
[b]111	Structured work situations
[b]112	Variable work schedules
[b]113	Consistent work schedules
114	Conflict situations
115	Extreme and changing temperature and humid/wet conditions
116	Social and civic obligations
117	Social service context

[a]Jobs were also profiled on 102 of the factors listed in this table. Factors from the General Physical Requirements and Work Context sections were not included in these profiles.

[b]This "factor" consists of OAI items that loaded on one of the interpreted poles of a bipolar factor.

[c]This factor is unnamed by Boese and Cunningham (1975).

APPENDIX C

COMPUTER-GENERATED HOMOGENEITY INDEX USED TO IDENTIFY CLUSTERS

CODAP[a]-Generated "Average Within" (Homogeneity) Index Used to Identify Clusters

With the CODAP hierarchical cluster analysis procedure (based on a procedure developed by Ward, 1961), an "average within" value is generated for clusters at each stage in the hierarchical solution. This index is defined as the "average amount of similar work performed by all members within a given group" (Oats-Hill, Inc., 1970, pp. viii-1). In the present study, this index was used as an aid in identifying meaningful clusters from the cluster hierarchy. The following formula for the "average within" index is based on an interpretation of the formula presented in the CODAP/360 User's Guide (Oats-Hill, Inc., 1970):

$$V^1_{jk} = \frac{V_j W_j^2 + V_k W_k^2 + 2B_{jk} W_j W_k}{(W_j + W_k)^2},$$

where: V^1_{jk}: the average-within value for the cluster formed by combining clusters j and k--the value of this index ranges from 0 to 100% with 100% meaning maximum similarity within a cluster,

V_j : the old average-within value for cluster j which is initially 100% when cluster j contained only one member,

V_k : the old average-within value for cluster k which is initially 100% when cluster k contained only one member,

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[a]CODAP (Comprehensive set of Occupational Data Analysis Programs)/Profile Analysis System developed by U. S. Air Force HRL Personnel Research Division, Lackland Air Force Base, Texas.

W_j and W_k: the number of members in clusters j and k--all clusters were initially composed of one member, and

B_{jk}: the computed similarity value between clusters j and k based on the similarity data matrix--this computed value is the average pair-wise similarity between members across clusters.

APPENDIX D

THE JOBS AND AVERAGE WORK-DIMENSION (FACTOR) PROFILES OF 21 MACRO CLUSTERS

Table 19. Job Titles and Associated DOT Codes Ranked According to the Education Level and Job-Related Preparation Scale Within Each of the 21 Macro Clusters

Table 20. Means and Standard Deviations for Each of the 21 Macro Clusters on 117 OAI Work Dimensions (Factors)

Table 21. Standardized Mean Scores for Each of the 21 Macro Clusters on 117 OAI Work Dimensions (Factors)

Table 19

Job Titles and Associated DOT Codes Ranked According to the Education Level and Job-Related Preparation Scale Within Each of the 21 Macro Clusters

Observation	ID	Title	DOT Code	Scale Score
1 Organizational and Human Relations Occupations				
1	991	Steward, Hotel	310.138	0
[a]2	815	Director, Museum of Art	102.118	0
[b]3	997	Security Officer, Vessel	372.363	1
4	40	Manager, Warehouse	184.168	1
5	163	Foreman, Record Press	559.132	1
6	190	Foreman	590.132	2
7	1114	Manager, Loss Prevention	184.168	3
8	1038	Contract Clerk Supervisor	239.138	3
9	1179	Manager, Food Checkers and Cashiers	319.168	3
10	846	Vending Enterprises Supervisor	185.168	3
11	446	Manager, Retail Food Store	185.168	3
12	1314	Supervisor, Mail Order	231.138	3
13	445	Proprietor-Manager, Retail Automotive Service	185.168	3
14	449	Manager, Theater	187.168	3
15	69	Credit Supervisor	240.138	3
16	789	Senior Accounting Clerk	160.138	3
17	1279	Supervisor, Payroll	219.138	3
18	562	Telephone Operator, Chief	235.138	3
19	795	Branch Bank Manager	186.168	3
20	796	Assistant Branch Bank Manager	186.138	3
21	1299	Supervisor, Communications Center	203.138	3
22	1009	Beauty Salon Manager	187.118	3
23	551	Supervisor, Stock	223.138	3
24	853	Route Supervisor	292.138	3
25	1284	Unload and Sort Supervisor	222.138	3
26	982	Manager, Airline Lounge	187.138	3
27	994	Hospitality House Supervisor	349.168	3
28	822	Customer Service Supervisor	241.138	3
29	401	Personnel Clerk	205.368	3
30	453	Employment Clerk	205.368	3

NOTE: The education/job-preparation scale and the OAI work elements from which the scale was constructed are shown immediately following this table. The footnotes for this table appear on p. 160.

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
31	979	Floor Representative	162.158	3
[b]32	475	Telephone Operator	235.782	3
33	1039	Eligibility Worker	249.168	3
34	1051	Chief Dispatcher	372.168	3
[b]35	851	Salesman, Beef	262.358	3
36	876	Telephone Credit Man	240.368	3
37	1063	Reservations Manager	187.118	3
38	68	Meter Reader, Chief	239.138	3
39	1414	Supervisor	235.132	3
40	31	Instructor, Bridge	159.228	3
41	847	Apprenticeship Training Representative	188.118	3
[b]42	1079	Utilities Service Inspector	376.868	3
43	160	Manager, Soap and Synthetics and Glycerin	558.885	3
44	291	Foreman, Refill Assembly	733.137	3
45	145	Paste Plant Shift Foreman	549.132	3
46	901	Manager, Front Office	187.168	3
47	908	Service Manager	299.138	3
48	1127	Cardroom Manager	343.138	3
49	905	Customer Service Supervisor	259.138	3
50	1205	Supervisor of Stewardess Services	352.138	3
51	962	Sales Floor Superintendent	299.137	3
52	1336	Material Requirements Man A and B	223.388	3
53	1232	Production Control Clerk	221.168	3
54	6	Material Scheduler	012.188	3
55	877	Mark-Up Man	249.388	3
56	931	Library Assistant	249.368	3
57	1304	Programmer, Detail	219.388	3
58	9	Surveyor	018.188	3
59	932	Manager-Salesman	259.118	3
60	1113	Administrator, Scheduling	169.268	4
61	1169	Systems Manager	189.118	4
62	1239	Department Head-Buyer	229.138	4
63	757	Motel Manager	320.137	4
64	43	Executive Housekeeper	187.168	4
65	774	Buyer, Grain	162.168	4
66	802	Credit and Collection Manager	168.168	4
67	1011	Mailing Foreman	239.138	4

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
68	264	Assembly Foreman	710.131	4
69	48	Chief Pilot	196.168	4
70	207	Shift Foreman, Specialty Manufacturing	616.130	4
71	903	Senior Collector	240.138	4
72	967	Parking Lot Supervisor	349.168	4
73	414	Programmer, Business	020.188	4
74	543	Production Clerk, Paperboard Products	221.168	4
75	772	Estimator	160.228	4
[b]76	810	Job Printer	973.381	4
77	870	City Sports Writer	143.068	4
78	955	General Manager	187.168	5
79	807	Purchasing Agent	162.158	5
80	1403	Savings Operations Officer	212.138	5
81	34	Manager, Sales	163.118	5
82	42	Controller	186.118	5
83	779	Manager, Office	169.137	5
84	782	Superintendent, Airport	184.118	5
85	447	Embalmer	338.381	5
86	1254	Evaluation Supervisor	219.138	5
87	954	Avionics Foreman	184.168	5
88	981	Chief Inspector	184.168	5
89	1325	Employment Interviewer	205.368	5
90	477	Claims Adjuster	241.168	5
91	107	Foreman, Plate Manufacturing	502.130	5
[b]92	1204	Cooked Foods Supervisor	319.134	5
93	1394	Portfolio Investment Analyst	139.168	5
94	950	Educational Data Processing Technician	099.128	5
95	1062	Steam-Plant Economy Control Supervisor	184.168	5
96	793	Policyholder's Information Clerk	204.268	5
97	24	Editor, Sports	132.038	5
98	751	Author	130.088	5
99	768	Columnist	132.068	5
100	1085	Script Writer	131.088	5
101	978	Display Manager	142.031	5
102	1089	Manager, Shoe Repair	187.118	5

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
103	1116	Vice President, Purchasing	189.118	6
104	440	Manager, City Circulation	163.118	6
105	1036	Dockmaster	187.118	6
106	832	Stewardess Service Manager	352.118	6
107	1167	Director, General Aviation	184.168	6
108	1168	Credit Manager	186.138	6
109	1061	Policy Issue Supervisor	169.138	6
110	1193	Secretary of Insurance Company	189.118	6
111	1166	Station Manager	184.118	6
112	776	Manager, Advertising	164.118	6
113	818	Supervisor of Employment	166.168	6
114	783	Operations Officer	186.168	6
115	784	Securities Trader	186.168	6
116	1060	Auditor	160.188	6
117	808	Personnel Manager	166.118	6
118	37	Administrative Assistant	169.168	6
119	1267	Assistant Secretary and Manager of C.O.P.	012.188	6
120	15	Market-Research Analyst I	050.088	6
121	443	Underwriter	169.188	6
122	753	Recreation Supervisor	187.118	6
123	754	Social Welfare Administrator	195.118	6
124	752	Executive Vice President of Chamber of Commerce	187.118	6
125	781	Manager, Area Development	184.118	6
126	805	Corporation President	189.118	6
127	778	Manager, Credit	168.168	6
128	771	Manager, Premium and Commission Accounting	160.168	6
129	819	Transfer Agency and Registrarship Administration	186.118	6
130	1288	Data Processing Director	229.118	6
131	1191	General Plant Manager	184.168	6
132	1035	Traffic and Credit Manager	184.168	6
133	777	Placement Officer	166.268	6
134	35	Personnel Representative	162.158	6
135	844	Legislative Liaison	165.068	6
136	871	Director, Advertising	164.118	6
137	36	Coordinator, Personnel Services	166.168	6
138	748	Clergyman	120.108	6

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
139	758	Teacher, Elementary School	092.228	6
140	436	Teacher, Secondary School	091.228	6
141	923	Language Teacher	099.228	6
142	809	Music Teacher	152.028	6
143	1137	Director, Religious Education	129.108	6
144	1246	Employment Service Counselor II	045.107	6
145	1247	Food Service Director	077.118	6
146	1053	Farm Youth Day-Haul Supervisor	319.134	6
147	410	Systems Analyst, Business-Electronic-Data Processing	012.168	6
148	413	Mathematician	020.088	6
149	441	Job Analyst	166.088	6
150	1319	Seismologist	024.081	6
151	1218	Civil Engineering Associate	018.188	6
152	1217	Production Change Analyst	012.168	6
153	1033	Treasurer	161.118	6
154	25	Technical Reporting Analyst	139.168	6
155	1296	Research Analyst	050.087	6
156	23	Policy Technician	099.128	6
157	1369	Analytical Engineer	020.088	6
158	845	Director, Sales Education	166.228	6
159	1004	Instructor, Programming Technology	097.228	6
160	411	Survey Worker	249.268	6
161	1220	Engineering Technician 6-10	040.031	6
162	406	Chemical Engineer	008.081	6
163	872	Director, Air and Water Control	168.118	6
164	1341	Waterworks Engineer	005.081	6
165	13	Microbiologist	040.081	6
166	803	Physicist	023.081	6
167	1290	Environmental Engineer VI	005.138	6
168	1081	Inventory Coding Supervisor	449.388	6
169	11	Hydrologist	024.081	6
170	1371	Water Bacteriologist	041.281	6
171	1396	Aquaculturist	041.031	6
172	1032	Publication Engineer	139.228	6
173	806	Production Manager, Advertising	164.138	6

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
174	1034	Executive Art Director	169.118	6
175	842	Art Coordinator	102.061	6
176	1043	Fashion Show Coordinator	297.138	6
177	935	Manager, Main Store	299.138	6
178	848	Recreation Facilities Designer	199.118	6
179	1192	Regional Claims Manager	186.118	7
180	437	Head Catalog Librarian	100.168	7
181	1223	Director, University Extension	090.118	7
182	1273	Principal	091.118	7
183	1164	Unemployment Insurance Hearing Officer II	110.107	7
184	21	Superintendent, Schools	091.118	7
185	804	Corporation Lawyer	110.118	7
186	418	Psychologist	045.088	7
187	419	Sociologist	054.088	7
188	20	Faculty Member, College or University	090.228	7
189	1271	Social Director	045.108	7
190	451	Case Worker	195.108	7
191	1163	Consumer Information Agent	096.128	7
192	1248	Department Head, College or University	090.168	7
193	417	Biologist	041.081	7
[b]194	1270	Assistant Ranger	040.288	7
195	22	Curator, Natural History Museum	102.168	7
2 Clerical Occupations				
1	66	Ticketer	229.588	0
2	1384	Receiver, Gate	222.488	0
3	1362	Scaleman	224.487	0
4	497	Classifier	361.687	0
5	1235	Jig and Tool Storage Man	223.387	0
6	1330	Biller, Mail Order	219.388	1
7	1338	Order Processor	229.368	1
8	521	Cashier-Wrapper	211.468	1
9	388	Log Scaler	941.488	1
10	797	Secretary	201.368	1
11	452	Stenographer and Inventory Clerk	202.388	1

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
12	457	Encoder	209.588	1
13	798	Typist	203.588	1
14	466	Proof-Machine Operator	217.388	1
15	1413	Wheel Press Clerk	229.588	1
16	1233	Production Operator	221.587	1
17	1312	Stem Checker and Recorder	224.487	1
18	65	Weigher II	224.487	1
19	1412	Weight Checker	224.587	1
20	827	Platform Foreman	299.138	1
21	529	Mail Desk Clerk	219.388	1
22	1118	Service Clerk	243.368	1
23	1052	Night Building Superintendent	381.137	1
24	60	Label Processor	222.388	2
25	1305	Billing Clerk	219.388	3
26	1307	Accounting Clerk B	219.588	3
27	1407	Accounting Machine Operator	219.588	3
28	59	Production Clerk II	221.388	3
29	460	Audit Clerk	210.388	3
30	461	Bookkeeper I	210.388	3
31	1383	Packing Clerk	221.388	3
32	54	Bookkeeping-Machine Operator I	210.388	3
33	813	Accounting Clerk	219.488	3
34	519	Cashier I	211.468	3
35	537	Invoice Control Clerk	219.488	3
36	1378	Clerk	211.468	3
37	56	Payroll Clerk	213.582	3
38	1255	Clerk Typist	219.388	3
39	57	Calculating-Machine Operator	216.488	3
40	1309	Shipping Clerk	222.368	3
41	467	General Office Clerk	219.388	3
42	1406	Billing Clerk I - Source Document Verifier	219.488	3
43	1301	Policy Issue Clerk	209.388	3
44	1231	Labor Analysis Clerk	219.488	3
45	1380	Monthly Reports Clerk	219.388	3
46	1388	Product Development Secretary	229.388	3
47	791	Teletype Operator	203.588	3
48	1091	Clerk Aide	237.368	3
49	513	Insurance Clerk	210.368	3
50	62	Traffic Clerk	222.588	3

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
51	1405	Secretary	201.368	3
52	1400	Correspondence Service Clerk	204.388	3
53	1313	Tallyman, Loading	229.368	3
54	473	Telephone Order Dispatcher	249.588	3
55	454	File Clerk II	206.388	3
56	1327	Assistant Cashier	211.468	3
57	403	Licensing Clerk	205.388	3
58	983	Credit Limit Follower	191.268	3
59	985	Credit Clerk	249.368	3
60	1012	Credit Manager	249.268	3
61	1225	Foreign Trade Services	204.388	3
62	1230	Receptionist Bookkeeper	219.388	3
63	848	Head Throw-Out Desk Clerk	240.388	3
64	1144	Reservations Clerk	242.368	3
65	58	Collection Clerk	219.368	3
66	1306	General Office Clerk	219.468	3
67	462	Teller	212.368	3
68	1277	Night Auditor	210.388	3
69	1302	Chief Cashier	211.138	3
70	517	Bookkeeper I	210.388	3
71	527	Transit Clerk	217.388	3
72	958	Lost Card Clerk	249.368	3
73	509	Checker I	209.688	3
74	528	Time Keeper Chief	219.138	3
75	522	Head Teller	212.138	3
76	792	Wires Transfer Clerk	203.588	3
77	1086	Financial Records Examiner III	160.187	3
78	1141	Assistant Cashier, Bookkeeping	186.168	3
79	1092	Remittance Supervisor	249.138	3
80	1229	Accounting Supervisor	217.138	3
81	53	Agency Appointments Supervisor	209.138	3
82	1355	Secretary	219.388	3
83	1194	Receptionist, Plywood Company	235.862	3
84	1274	Stenographer and Inventory Clerk	202.388	3
85	1276	Office Girl	209.368	3
86	52	Transcribing-Machine Operator	208.588	3
87	464	Key Punch Operator	213.582	3
88	515	Billing-Control Clerk	210.388	3
89	1324	Senior Composer-Operator	203.382	3

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
[b]90	1316	Tooling Specialist	007.187	3
91	1328	Terminal Operator	213.582	3
92	525	Billing Machine Operator	214.488	3
93	463	Digital Computer Operator	213.382	3
94	1228	Supervisor and Lead Computer Operator	213.132	3
95	1257	Assistant Foreman, Prize and Chest	221.133	3
96	1258	Test Inspector	221.688	3
97	1377	Car Checker	209.588	3
98	1376	Engineering Master Layout Control Man	206.388	3
99	1238	Pole Inspector	229.687	3
100	71	Authorizer, Regular Accounts	249.388	3
101	1357	Assistant Dispatcher	219.588	3
102	1256	Power Load Records Clerk	219.488	3
103	1382	Meter Book Assembly and Billing Clerk	219.588	3
104	850	Potline Monitor	249.487	3
105	895	Log Scaler	941.488	3
[b]106	133	Cook, Kettle	526.782	3
107	1264	Hospital Admitting Clerk	237.368	3
108	1375	Supervisor of Correspondence Section	204.138	3
109	1117	Supervisor, Telephone Information	237.138	3
110	468	Ward Clerk	219.388	3
111	1326	Advertising Clerk	209.388	3
112	405	Classification Clerk	206.388	3
113	1251	Perforator Operator	208.588	3
114	1329	Coding Clerk	219.388	3
115	1333	Tool Order Control Clerk	221.388	3
116	1263	Runner	230.587	3
117	930	Floor Reporter	239.588	3
118	1227	Fuel-Oil Clerk	210.388	4
119	1281	Monthly Report Clerk	219.488	4
120	1335	Piping Materials Control Clerk	223.368	4
[b]121	764	Time Study Analyst I	012.288	4
122	1280	Senior Clerk	219.388	4
123	1252	Material Usage Auditor	210.388	4
124	1300	Receptionist-Secretary	205.368	4
125	536	Airport Clerk	219.388	4
126	70	Order Clerk II	249.368	4
127	30	Racing Secretary and Handicapper	153.168	4
128	1358	Clerk	221.388	4
129	51	Correspondence Clerk	204.288	4

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
[b]130	1399	Assistant Manager	201.138	4
131	790	Medical Secretary	201.368	4
132	524	Card-Tape Machine Operator A	213.382	4
133	1249	Hearings Reporter	202.387	4
134	1226	Clerk-Typist, Compositer	207.382	4
135	1303	Mill Recorder, Computerized Mill	213.382	4
136	444	Unemployment Insurance Claims Administrator	169.268	4
137	458	Checker II	209.688	5
138	785	Loan Officer	186.288	5
[b]139	811	Industrial Engineering Technician	012.288	5
140	442	Credit Man	168.268	5
141	1184	Cash Shortage Investigator	376.268	5
142	1332	Accounting Clerk B	219.488	5
143	1250	Secretary-Assistant to Personnel Services Coordinator	205.268	5
144	1224	Secretary-I, Personnel	201.368	5
145	32	Accountant	160.188	6
146	989	Log Sales Coordinator	299.118	6
147	1115	Operations Assistant	186.168	6
148	869	Medical Record Librarian	100.163	6
[b]149	1087	Data Processing Manager	169.168	6
150	1381	Student Assistant	219.488	6
[b]151	1373	Electroencephalograph Technician	078.368	6
[b]152	1111	News Director	131.038	6
[b]153	820	Claims Manager	189.118	6
154	1379	Unit Supervisor	216.368	6
[b]155	1323	Teacher, Speech	091.228	6
3 Sales and Customer Service Occupations				
1	1331	Coffee Shop Hostess	219.468	0
2	874	Manager, Restaurant or Coffee Shop	187.168	0
3	907	Newspaper Carrier	291.868	0
4	882	Platform Man, Ice	299.867	0
5	829	Car Hop	311.878	0
6	961	Salesclerk, Health Foods	290.478	0
7	469	Fountain Girl	219.878	0
8	834	Curb Boy	369.478	0
9	370	Dockmaster	911.873	0
[b]10	100	Egg Room Supervisor	412.864	0
[c]11	682	Usher, Head	344.138	0
[c]12	1100	Inspectress	321.138	0
13	707	Ticket Agent	919.368	1

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
14	478	Hotel Clerk	242.368	1
15	1075	Usher	344.878	1
[b]16	1170	Training Operator	235.322	1
17	831	Golf Course Starter	341.368	1
18	1173	Salesperson-Men's Clothing	263.458	1
19	1197	Salesperson-Women's Shop	263.358	1
20	1199	Salesman-Driver, Diapers	292.358	1
21	1175	Lunch Truck Driver	292.468	1
22	1146	Salesperson, Men's and Boys' Clothing	263.458	1
23	1069	Owner-Salesperson, Stamps	289.358	1
24	952	Liquidation Broker	162.158	1
25	990	Clerk, Costumes	299.454	1
26	993	Fitter, Wigs	332.271	1
27	55	Ticket Seller	211.468	1
28	86	Press Box Custodian	344.878	1
29	1122	Director of Group-Sales	293.358	1
30	1195	Customer Service Clerk	241.368	1
31	941	Check Room Chief	358.137	1
32	824	Salesperson-Shoes	263.358	1
33	81	Combination Girl	314.878	1
34	628	Vendor	291.858	1
35	487	Grocery Checker	299.458	1
36	643	Bar Boy	312.887	1
37	705	Automobile Service Station Attendant	915.867	1
38	488	Countergirl	317.878	1
[b]39	703	Tractor-Trailer Truck Driver	904.883	1
40	485	Routeman, Retail Dairy Products	292.358	1
41	633	Wine Steward	310.137	1
[c]42	93	Guard, Captain	372.168	1
[c]43	1024	Guard, Sergeant	372.368	1
44	675	Superintendent, Service	329.138	2
[b]45	496	Teacher, Nursery School	359.878	2
46	44	Manager, Catering	187.168	2
47	925	Purchasing Steward	162.158	2
[c]48	373	Car Wash Supervisor	915.137	2
49	656	Order Clerk, Food and Beverages	319.468	3
50	603	Salesman, Trading Stamps	252.358	3
51	986	Sales Representative	257.258	3
52	1145	Field Representative	252.258	3
53	1067	Tour Agent	255.358	3
54	479	Salesman, Real Estate	250.358	3
55	1044	Telephone Order Taker	299.368	3
56	1121	Assistant Sales Manager	289.158	3
57	573	Hotel Clerk	242.368	3

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
58	1171	Assistant Reservation Manager	242.368	3
59	1088	Public Service Director	184.168	3
60	72	Representative, Personal Service	257.258	3
61	886	Chief Steward	350.138	3
62	49	Conductor, Passenger Car	198.168	3
63	1065	Information Desk Clerk	237.368	3
64	1066	Delivery Information Counter Supervisor	249.138	3
65	1275	Assistant Registrar	205.368	3
66	1078	Administrative Assistant	372.168	3
67	1013	Communications Consultant	257.258	3
68	1017	Estimator, Carpeting	299.388	3
69	878	Salesman, Storage	259.258	3
70	1068	Salesman, Business Forms	265.358	3
71	1097	Wedding Gift Consultant	299.358	3
72	75	Silver Saleslady	283.458	3
73	988	Head Bakery Sales Clerk	290.478	3
74	41	Manager, Store	185.168	3
75	1174	Manager, Music Store	287.358	3
76	1198	Manager, Piano Store	287.358	3
77	1014	Field Salesman, Floor Tile	274.358	3
78	1120	Salesman, Leather Goods	264.358	3
79	1200	Customer Service Representative	299.258	3
80	484	Bakery-Wagon Driver	292.358	3
81	73	Salesperson, Men's Furnishings	263.358	3
82	76	Salesperson, Book	289.358	3
83	482	Salesperson, General	289.458	3
84	621	Salesman, Floor Coverings	274.358	3
85	591	Salesman, Financial Service	252.258	3
86	1126	Manager, Mobile Home Park	320.168	3
87	825	Salesman-Sporting Goods	286.358	3
88	960	Salesman, Batteries	278.358	3
89	1353	Cashier	211.468	3
90	1123	Clerk, Formal Wear	241.368	3
91	1149	Head of Stock	299.358	3
92	963	Customer Gift-Wrapper	279.464	3
93	77	Groceryman, Journeyman	290.468	3
94	1404	Food Checker	216.488	3
95	526	Food Tabulator, Cafeteria	216.588	3
96	489	Waitress	311.878	3
97	706	Dispatcher, Motor Vehicle	919.168	3
98	483	Sales Clerk	290.478	3
99	641	Bartender	312.878	3
100	696	Baggageman	358.878	3
101	664	Automat-Car Attendant	319.864	3
102	84	Dock Attendant	329.874	3
[b]103	677	Manicurist	331.878	3

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
104	472	Weighing-Station Operator	224.487	3
105	505	Exterminator	389.884	3
106	690	Guide, Establishment	353.368	3
107	1154	Airport Tour Guide	353.368	3
108	1178	Cook-Manager	313.131	3
[b]109	1132	Hatchery Manager	412.137	3
[c]110	83	Housekeeper	321.138	3
[c]111	325	Supervisor Alteration Workroom	785.138	3
[c]112	1104	Captain, Industrial Guard	372.138	3
[c]113	1253	Supervisor, Key Punch	213.132	3
[c]114	1310	Magazine Foreman	223.138	3
115	987	Salesman, Ready-Mix Concrete	276.358	4
116	1008	Assistant Manager, Refuse Collection	184.168	4
117	1093	Sales Representative	280.158	4
118	1041	Salesman, Furniture	274.358	4
119	879	Assistant Store Manager	283.358	4
120	623	Salesperson, Sporting Goods	286.358	4
121	873	Manager, Building Supplies	185.158	4
122	1095	Assistant Circulation Manager	289.358	4
123	1176	Dockmaster	299.358	4
124	481	Salesperson, Automotive Parts	289.358	4
125	50	Gemologist	199.281	4
[b]126	89	Housemother	359.868	4
[b]127	423	Dietitian	077.168	4
128	1042	Salesperson, Pets	289.358	4
[c]129	673	Bell Captain	324.138	4
[c]130	653	Kitchen Steward	318.138	4
[c]131	1285	Receiving Foreman	223.138	4
132	607	Traffic Agent	255.258	5
133	800	Insurance Salesman	250.258	5
134	959	Retail Advertising Salesman	258.358	5
135	1070	Comparison Shopper	296.388	5
136	1040	Group and Convention Sales Representative	255.358	5
137	898	Manager, Promotion	163.118	5
138	689	Airplane Stewardess	352.878	5
[b]139	1157	Fraud Investigator	376.268	5
140	74	Salesman, Building and Construction, Equipment and Supplies	276.358	5
141	480	Salesman, Construction Machinery	276.358	5
142	1094	Company Representative, Wall-covering	265.358	5
143	881	Department Manager - Men's Clothing	299.138	5
144	854	Department Manager - Women's Shop	299.138	5

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
145	900	Showroom Manager	185.158	5
146	618	Salesman, Food Products	262.358	5
147	616	Salesman, Soft-Water Service	259.358	5
148	1181	Receptionist, Airline Lounge	352.868	5
[b]149	1165	Music Director	159.048	5
150	684	Director, Recreation	352.168	5
151	637	Hostess, Restaurant or Coffee Shop	310.868	5
152	448	Manager, Cafeteria or Lunchroom	187.168	5
153	609	Salesman, Public Utilities	257.358	6
154	38	Production Superintendent	180.118	6
155	1172	Travelers Cheque Representative	252.258	6
156	1196	Merchant Sales Representative	252.258	6
[b]157	1006	Forester	162.118	6
158	906	Sales Representative	280.158	6
159	933	Salesman, Communication Equipment	278.258	6
160	852	Salesman	285.358	6
161	622	Home Service Representative	278.258	6
162	1119	Senior Program Merchandiser	253.158	6
163	614	Salesman, Advertising	258.358	6
164	620	Salesman, Paper and Paper Products	265.358	6
165	775	Manager, Utility Sales and Service	163.168	6
166	605	Salesman, Radio and Television Time	253.358	6
[b]167	1142	Manager, Design and Cost	189.118	6
[c]168	1021	Operations Manager, Recreation	349.118	6
[c]169	1370	Laboratory Director	029.138	6
[c]170	1372	Director of Nursing Services	075.118	6
[b]171	755	Librarian	100.168	7
4 Protective Service Occupations				
1	835	Security Guard	372.868	0
2	1101	Upstairs Man	343.268	0
3	500	Corrections Officer	372.868	1
4	1105	Warehouse Investigator	376.868	1
5	94	Watchman I	372.368	1
6	1143	Communication Center Operator	235.767	1
7	502	Patrolman	375.268	3
8	1131	Store Detective	376.868	3
9	1208	Airport Safety and Security Officer	375.268	3

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
10	476	Telephone Answering Service Operator (monitors alarm systems)	235.862	3
[b]11	564	Receptionist	237.368	3
12	95	House Officer	376.868	4
[b]13	1059	Staff Newsman/Mobile Unit	131.263	6
5 Material/Product Handling, Inspecting, and Recording Occupations				
1	742	Shipping Clerk II	222.587	0
2	1410	Stock Clerk	223.387	0
3	1385	Linen Room Worker	223.387	0
4	1387	Rotex Man	224.487	0
5	384	Material Handler	929.887	0
6	1183	Folder-Wrapper	369.887	0
7	1361	Stock Clerk	223.687	0
8	976	Book-and-Game-Line Attendant	920.887	0
9	64	Tallyman	223.588	0
10	309	Glueman	762.884	0
11	334	Inspector	789.687	0
12	585	Sock Knitter	684.885	0
13	662	Seamer	787.782	0
14	285	Checker and Tester	729.387	0
15	1334	Inspector-Shipping General	222.387	0
16	228	Veneer Clipper	663.885	0
17	1234	Production Operator	222.683	0
[b]18	409	Multilith Operator	207.782	0
19	728	Order Filler	922.887	1
20	936	Packing Center Package Desk Attendant	299.478	1
21	1048	Colorman, Racing	346.687	1
22	1236	Stock Clerk Helper	223.887	1
23	550	Receiving Clerk	222.387	1
24	1411	Utility Hand	223.687	1
25	1408	Production Operator	221.487	1
26	1402	Bulk Marker	209.588	1
27	1401	Killman	206.587	1
28	1386	Bin Assorter	223.887	1
29	1177	Ready-to-Wear Hanger	299.887	1
30	1287	Weigher and Recorder	224.487	1
31	741	Mounter, Automatic	976.885	1
32	399	Slitter, Processed Film	976.884	1
33	624	Coil Finisher	724.887	1
34	582	Stocking Inspector	684.684	1
35	336	Sample Girl	789.887	1

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
36	1083	Capacitor Winder	726.884	1
37	394	Quality Control Projectionist	960.382	1
38	1082	Rewinder Operator	640.885	1
39	372	Soapery Pumper	914.885	1
40	1311	Tool Crib Attendant	223.387	2
41	557	Parcel Post Clerk	231.388	2
42	531	Autoclave Operator	553.782	2
43	974	Levers-Lace-Machine Operator	683.782	2
44	756	Stock Clerk	223.367	3
45	1260	Stock Room Attendant	223.387	3
46	1409	Apron Writer; Receiving Clerk	222.587	3
47	1308	Production Operator	221.388	3
48	1356	Time Checker	219.488	3
49	382	Laborer, Stores	922.887	3
50	1286	Store Room Clerk	223.387	3
51	63	Stock Clerk	223.387	3
52	1360	Container Control Clerk	223.387	3
53	350	Cooling-Tank Tester	827.384	3
54	240	Threader	685.780	3
55	257	Water Tester	703.687	3
56	549	Inspector, Continuous-Weld-Pipe Mill	619.381	3
57	1354	Data Processing Technician	213.885	3
[b]58	1283	Order Man, Set Packing	221.388	4
[b]59	320	Patternmaker	781.381	4
60	113	Casting Inspector	684.684	4
61	474	Mailing-Machine Operator	234.782	4
[b]62	1322	Certified Orthotist and Prosthetist	078.261	6
6 Occupations in Applied Physical Science and Technology				
1	148	Finish Mixer	550.884	0
2	314	Finish Inspector-Instructor	774.384	1
3	365	Foreman	869.134	1
[b]4	611	Casing Inspector	715.687	1
5	1007	Industrial Waste Inspector	168.287	1
6	654	Glass Blower, Laboratory Apparatus	772.281	2
[b]7	692	Plasterer	842.781	2
8	290	Foreman, Plating and Point Assembly	733.130	2
9	165	Chemical Operator III	559.782	2

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
10	1392	Factory-Special Assignments Man; Modernization and Development Liaison Man	012.168	3
11	3	Tool Designer	007.081	3
12	212	Foreman, Production Department	621.131	3
13	686	Aircraft Mechanic	801.381	3
14	278	Factory Supervisor	723.132	3
15	343	Inspector, Fabrication	807.381	3
16	1368	Systems Layout Man	017.281	3
17	1365	Engineering Draftsman A and B	002.281	3
18	162	Polymerization Foreman	559.130	3
19	928	Operations Manager	187.168	3
20	558	Gas Appliance Serviceman	637.281	3
21	1219	Formulator	022.081	3
22	760	Chemical Laboratory Technician	029.381	3
23	535	Pilot-Control Operator	559.782	3
24	1395	Technician	029.381	3
25	5	Spectroscopist	011.281	3
26	1000	Quality Control Worker	529.387	3
27	1139	Roadmaster	182.168	3
28	1393	Civil Engineering Draftsman	017.281	4
29	8	Draftsman, Detail	017.281	4
30	404	Draftsman, Mechanical	001.281	4
31	1037	Superintendent, Maintenance	189.168	4
32	780	General Foreman	183.168	4
33	1240	Instrumentation Research and Development Technician	003.181	4
34	344	Yard Superintendent	809.131	4
35	316	Patternmaker, Plaster	777.381	4
36	763	Director, Quality Control	012.168	4
37	1243	Surveying Technician	018.288	4
38	18	Bio-Instrumentation Technician	078.368	4
39	1187	Refrigeration and Heating Mechanic	637.351	4
40	14	Lab Technician, Microbiology	041.281	4
41	188	Cloth Finisher I	589.137	4
42	412	Engineering Aide II	019.281	5
43	1343	Designer, Electromechanical	017.281	5
44	927	Communications Electrician Foreman	184.168	5
45	46	Manager, Industrial Organization	189.118	5
46	977	Instructor, Computer Operations	097.228	5
47	1031	Instructor, Technical	097.228	5
48	1366	Lead Civil Engineering Draftsman	005.281	5
49	1348	Special Procedure Radiologic Technologist	078.268	5

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
50	821	Test Laboratory Supervisor	199.131	5
51	1269	Assistant Laboratory Technician	022.381	5
52	4	Production Engineer	010.168	6
53	1342	Manufacturing Engineer	008.081	6
54	7	Nuclear Engineer	015.081	6
55	1266	Mechanical Engineering Assistant, Steam Plants	007.181	6
56	1216	Mechanical Engineer II	007.081	6
57	1391	Automotive Engineer	007.081	6
58	1	Maintainability Design Engineer	002.081	6
59	1241	Assistant Chief Engineer	007.181	6
60	1064	Maintenance and Construction Superintendent	189.138	6
61	1291	Tool Programmer, Numerical Control	007.187	6
62	1242	Production Engineer	012.188	6
63	1315	Cief Engineer	005.168	6
64	801	Building Designer	001.081	6
65	1317	Forest Engineer	013.131	6
66	1221	Human Factors Specialist	045.088	6
67	1292	Industrial Engineer Supervisor	012.188	6
68	1349	Teacher, Industrial Arts	091.228	6
69	2	Electronic Engineer	003.081	6
70	1215	Electrical Engineer	003.081	6
71	1265	Electrical Engineering Associate	003.187	6
72	1344	Manager, Systems Planning and Program Development	020.018	6
73	39	Superintendent, Tests	184.168	6
74	392	Field Engineer	957.288	6
75	10	Chemist, Organic	022.081	6
76	1244	Textile Chemist	022.281	6
77	16	Pharmacist	074.181	6
78	1347	Chief Pharmacist	074.118	6
79	744	Wood Technologist	040.081	6
80	408	Metallurgical Technician	011.181	6
81	1295	Biologist	041.081	6
82	1340	Naval Architect	001.881	7
83	1268	(Photomask) Engineer	019.081	7
84	761	Thermodynamics Engineer	002.081	7
85	762	Cost Analysis Engineer	002.187	7
86	1294	Physicist	023.081	7
[b]87	45	Commissioner, Public Utilities	188.118	7
88	765	Biochemist	041.081	7
89	899	Quality Control Pharmacist	168.168	7
90	953	Public Health Sanitarian	168.281	7

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
7 Occupations in Electronic/Electrical Equipment/Systems Operation				
1	957	Signal Operator	239.368	3
2	67	Telegrapher	236.588	3
3	984	Dispatcher	239.285	3
4	47	Radio Operator	193.282	3
5	788	Captain, Fishing Vessel	197.133	3
6	889	Watchman I	372.868	3
7	956	Senior Radio Operator	193.132	4
8	450	Air-Traffic Control Specialist, Tower	193.168	5
9	731	Power Plant Operator	952.782	6
10	787	Airplane Captain	196.283	6
11	875	First Officer, Airline	196.283	6
12	902	Second Officer, Airline	196.282	6
8 Occupations in Farming, Forestry, and Other Botanically Related Occupations				
1	743	Tobacco Grower	405.181	1
[b]2	861	Owner-Manager, Laundromat	369.138	1
3	945	Cranberry Grower	404.161	2
4	814	General Manager, Farm	180.118	3
5	104	Forester Aide	441.384	3
6	1133	Fire Lookout	441.368	3
7	712	Vegetable Grower	403.181	3
8	714	Rose Grower	406.181	3
9	99	Grass Farmer	406.181	4
10	773	Logging Manager	162.158	4
11	713	Berry Grower	404.181	4
12	718	Dairy Farmer	411.181	4
13	723	Cattle Rancher	413.181	4
14	733	Farmer, General	421.131	4
15	1186	Operations Forester	441.118	6
16	416	Forester	040.188	6
17	1245	Agriculturist, Air and Water Pollution Control	040.081	6
18	1054	Timber Agent	449.268	6
19	1189	Director, Arboreta	102.118	7
20	1320	Wildlife Research Biologist	041.081	7

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
9 Health-Related Occupations				
[a]1	887	Instructor	359.368	0
2	88	Nurse Aide	355.878	1
3	494	Cottage Parent	355.878	1
4	632	Homemaker	309.878	1
5	1058	Home Management Aide	096.228	1
6	1102	Medicine Aide	355.371	3
7	1128	Plant Nurse	354.368	3
8	495	Psychiatric Aide	355.878	3
9	426	Medical Laboratory Assistant	078.381	3
10	432	Medical Assistant	079.368	3
11	1076	Physical Therapy Assistant	355.875	3
12	1397	Supervisor of Nursing Care	075.128	3
13	1020	Hostess Home-for-Aged	329.168	3
14	1112	Waterfront Coordinator	159.228	3
15	429	Occupational Therapy Aide	079.368	3
[b]16	1130	Manager of External Security	372.138	3
17	433	Nurse, Licensed Practical	079.378	4
18	424	Dental Hygienist	078.368	4
19	425	Radiologic Technologist	078.368	4
20	1272	Supervisor, Technical Services	078.168	5
21	439	Camp Counselor	159.228	5
22	929	Director, Camp	195.168	5
23	17	Nurse, General Duty	075.378	6
24	1222	Industrial Nurse	075.378	6
25	430	Psychiatric Technician	079.368	6
26	434	Surgical Technician	079.378	6
27	747	Rehabilitation Counselor	045.108	6
28	19	Physical Therapist	079.178	6
29	427	Medical Technologist	078.381	6
30	786	Superintendent, Home for Aged	187.118	6
31	1345	Biological Tester	041.281	6
32	428	Occupational Therapist	079.128	6
33	1398	Art Therapist	079.128	6
34	766	Athletic Coach	099.288	6
35	1374	Rehabilitation Teacher of the Visually Impaired	094.208	6
36	1190	Teacher, Physical Education	153.228	6
37	1321	Radiation-Therapy Radiologist	070.108	7
38	746	Psychiatrist	070.108	7
39	745	Osteopath	071.108	7
40	1346	Obstetrical Consultant	070.108	7
41	420	General Practitioner	070.108	7
42	422	Veterinarian	073.108	7

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
43	1297	Chief Laboratory Technologist	078.168	7
44	421	Dentist	072.108	7
10 Personal Service Occupations				
1	968	Skycap	357.878	0
2	885	Locker-Room Attendant	335.878	0
3	943	Gateman	372.868	0
4	944	Front-Elevator Operator	388.868	0
5	1180	Railroad Ride Operator	342.863	0
6	934	Coffee-Cart Man	290.878	0
7	937	Manager, Juice Bar	311.867	0
8	855	Checker, Fitting Room	299.868	0
9	909	Skate-Shop Man	299.864	0
10	681	Reducing Machine Operator	339.878	1
11	1047	Doorman II	324.878	1
12	1049	Tray-Line Worker	355.878	1
13	490	Waitress II	311.878	1
14	1202	Bartender	312.878	1
[b]15	486	Routeman, Wholesale Ice Cream Products	292.358	1
[b]16	619	Salesman, Leather Products	264.358	1
[b]17	1148	Routeman, Film	292.483	1
18	493	Cosmetologist	332.271	2
19	964	Hostess, Restaurant or Coffee Shop	310.868	3
20	1204	Monorail Operator	342.863	3
21	1015	Bakery Sales Clerk	290.478	3
22	1152	Dining Room Attendant, Hospital	319.467	3
23	1153	Wharf Attendant	342.867	3
24	858	Manicurist and Facial Operator	332.361	3
[b]25	1016	Fieldman	298.387	3
26	939	Haircutter	332.271	4
27	966	Hair Colorist	332.271	4
28	640	Waiter, Head	311.138	4
29	85	Hair Stylist	332.271	4
30	492	Barber	330.371	4
31	912	Make-Up Specialist	332.361	4
11 Occupations in the Performing Arts				
[a]1	750	Musician	152.048	0
2	29	Bugler	152.048	3
3	1138	Executive Producer	159.118	6
4	1298	Music Supervisor	091.168	7

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
12 Occupations Dealing with Visual Aesthetics				
1	749	Artist	144.081	2
2	951	Jewelry Designer	142.081	3
3	735	Stripper	971.381	3
4	78	Display Man	298.081	4
5	816	Artist-Writer	149.081	4
6	438	Clothes Designer	142.081	4
7	897	Artificial Tree Maker	142.381	4
8	26	Illustrator	141.081	5
9	1005	Lay-Out Artist	141.081	5
10	924	Industrial Designer	142.081	5
11	27	Cloth Designer	142.081	6
12	767	Furniture Designer	142.081	6
13	843	Sculptor	148.081	6
14	770	Art Teacher	149.028	7
13 Occupations in Animal Care				
1	721	Farm Hand, Dairy I	411.884	0
2	724	Farm Hand, Livestock	413.884	0
3	995	Groomer	356.274	0
4	693	Stableman	356.874	0
5	105	Livestock Caretaker, Yard-Or-In-Transit	466.887	1
6	940	Manager-Owner, Pony Ride	349.228	1
7	913	Pony Ride Attendant	349.878	1
8	33	Buyer, Livestock	162.158	3
9	890	Hatchery Superintendent III	436.138	3
10	1210	Hatchery Assistant II	436.884	3
11	691	Animal Keeper, Head	356.138	3
12	503	Fish and Game Warden	379.168	3
13	729	Farm Foreman	429.131	3
14	507	Artificial-Breeding Technician	467.384	3
[b]15	700	Lifeguard	379.868	3
16	1106	Dairy General Manager	411.168	4
14 Occupations in Assembly and Fabrication				
1	277	Heavy Assembler	721.884	0
2	310	Frame Maker	763.884	0
3	1002	Assembler, Small Products	739.887	0
4	300	Gluer II	739.887	0
5	948	Hose Maker	752.781	0
6	840	Gasoline-Engine Assembler	806.781	0

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
7	303	Tire Mounter	750.887	0
8	709	Wrapper	920.687	0
9	286	Assembler V	731.885	0
10	1213	Welder, Production Line	810.884	0
11	376	Filling-Machine Operator	920.885	0
12	666	Garment Folder	789.887	0
13	326	Sewing Machine Operator, Regular Equipment	786.782	0
14	589	Looper	689.782	0
15	327	Binder II	787.782	0
16	328	Brim-Welt-Sewing-Machine Operator	787.782	0
17	338	Upholsterer	799.381	0
18	663	Gloves Sewer	787.782	0
19	660	Hat Trimmer	784.884	0
20	581	Battery Loader	683.886	0
21	588	Burler	689.684	0
22	329	Edger	787.782	0
23	1201	Sample Maker, Button Cards	299.884	0
24	318	Cushion Man	780.884	0
25	888	Fitter	365.781	0
26	636	Battery Assembler	727.887	0
27	298	Assembler, Metal Furniture	739.884	1
28	646	Assembler, Metal Furniture	739.884	1
29	261	Vending Machine Assembler	706.884	1
30	296	Stone Setter	735.887	1
31	274	Assembler	716.884	1
32	608	Gas-Pump-Computer Assembler	710.884	1
33	639	Fishing Rod Assembler	732.884	1
34	665	Cementer, Hand	788.887	1
35	730	Rotary-Driller Helper	930.884	1
36	634	Module Assembler	726.887	1
37	1056	Assembler, Accessories	729.887	1
38	645	Case Coverer	739.884	1
39	287	Bracket Mounter	732.884	1
40	319	Upholsterer II	780.884	1
41	894	Furniture Upholsterer	780.381	1
42	266	Instrument Assembler	710.884	1
43	642	Fireworks Assembler	737.887	1
44	647	Venetian Blind Assembler	739.884	1
45	625	Grid Operator	725.884	1
46	635	Mounter I	726.887	1
47	604	Power Lawn Mower Assembler	706.884	1
48	671	Outboard Motor Assembler	806.781	1
49	246	Assembly-Press Operator	690.885	1
50	253	Stapling-Machine Operator	692.885	1

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
51	345	Can Solderer	814.884	1
52	584	Transfer Knitter	684.782	1
53	333	Tapes Top Line of Quarters	788.887	1
54	245	Stitcher, Special Machine	690.782	1
55	590	Hosiery Looper	689.782	1
56	659	Seamstress	782.884	1
57	239	Weaver, Narrow Fabrics	683.782	1
58	563	Bag Machine Operator	649.885	1
59	560	Box Machine	641.885	2
60	661	Seamstress, Women's Garment Alterations	785.381	2
61	312	Inspector-Packer	769.687	2
62	1188	Assembler, Rental Equipment	712.887	3
63	273	Assembler, Suspension Component "A"	716.781	3
64	593	Fancy Stitcher	690.782	3
65	307	Emergency Equipment Repairman	759.384	3
66	280	Tailor II	725.281	3
67	322	Hosiery Mender	782.884	3
68	342	Engine Assembler	806.884	4
69	1136	Assembler	826.884	4
70	1363	Senior Carpet Mechanic	229.381	4
15 Structural Work Occupations				
1	361	Lip-And-Gate Builder and Oiler Maintenance Man	861.381	0
2	359	Carpenter Helper, Maintenance	860.887	0
3	794	Maintenance Carpenter	860.281	0
4	698	Carpenter, Floor Rolling	864.781	0
5	364	Carpenter-Floor Rolling	864.781	0
6	218	Millwright	638.281	0
7	601	Grinder-Chipper I	705.884	0
8	354	Ceiling Man	842.884	0
9	694	Carpenter	860.381	1
10	674	Automobile Body Repairman	807.381	1
11	921	Bench Carpenter	760.884	1
12	263	Tube Finisher and Assembler "A"	709.884	1
[b]13	276	Instrument Adjuster	716.884	1
14	214	Reed Man	628.884	1
15	362	Pipe-Fitter, Maintenance	862.381	1
16	678	Welder, Arc	810.884	1
17	695	Bricklayer	861.381	1
18	676	Ornamental Iron Worker	809.381	2
19	680	Welder, Combination	812.884	2

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
20	340	Sheet-Metal Worker	804.281	3
21	548	Metal, Fabricator I	619.380	3
22	254	Model Maker I	693.381	3
23	346	Welder	819.381	3
24	360	Bricklayer Helper	861.381	3
25	116	Foundry Worker, General	519.887	3
26	227	Patternmaker, Wood	661.281	4
27	570	Cabinet Maker	660.280	4
28	658	Furniture Upholsterer	780.381	4
29	670	Shipfitter	806.381	4
30	269	Dental Laboratory Technician	712.381	4
16 Mechanics and Stationary Machine/Equipment Repairers and Operators				
1	586	Knitting Machine Operator	685.885	0
2	610	Hairspring Vibrator	715.381	0
3	596	Pairing Machine Operator	691.782	0
4	128	Ice Maker	523.885	0
5	236	Drawing-Frame Tender	680.885	0
6	574	Carding Machine Operator	681.885	0
7	230	Gang Sawyer	667.782	0
8	202	Pressman	611.782	0
9	159	Extruder Operator	557.782	0
10	534	Record-Press Tender	556.885	0
11	111	Furnace Operator	512.782	0
12	866	U-Belt Wrapper	690.885	0
13	868	Mounter, Color Film	976.885	0
14	356	Pipe Layer	851.884	0
15	863	Rigger	431.263	0
16	330	Hemmer	787.782	0
17	580	Weaver	683.782	0
18	947	Circular Knitter	685.885	0
19	341	Air-Conditioning Installer, General	806.781	1
20	697	Pipe Fitter, Maintenance	862.381	1
21	555	Diesel Mechanic	625.281	1
22	1108	Vending-Machine Repairman	639.381	1
23	249	Armoring-Machine Operator	691.885	1
24	631	Cable Maker	726.884	1
25	595	Extruding Machine Operator	691.885	1
26	949	Marker II	920.887	1
27	209	Fabricator A-Cutting Department	619.380	1
28	235	Sawman	677.782	1
29	216	Propellant-and-Gas Mechanic	630.781	1
30	1055	Envelope-Machine Set-Up Man	641.780	1
31	121	Centrifuge Operator	521.885	1

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
32	150	Centrifuge Operator	551.885	1
33	542	Production-Machine Operator	609.885	1
34	387	Panelboard Operator	939.782	1
35	571	Woodworking Machine Operator	669.782	1
36	28	Photographer, Finish	143.382	1
37	532	Compression-Molding Machine Tender	556.885	1
38	600	Ring Stamper	700.884	1
39	946	Blown Plastic Container Machine Operator	556.885	1
40	545	Wire Drawer	614.782	1
41	597	Firesetter	692.380	1
42	865	Production Mechanic, Tin Cans	619.380	1
43	594	Stitcher, Standard Machine	690.782	1
44	579	Loom Fixer	683.280	2
45	195	Honing Machine Set-Up Operator, Tool	603.782	2
46	250	Maintenance Mechanic, Wire Department	692.280	2
47	197	Turret-Lathe-Set-Up Operator, Tool	604.280	2
48	194	Tool-And-Die Maker	601.280	2
49	211	Automobile Mechanic	620.281	2
50	552	Automobile Service Station Mechanic	620.381	2
51	554	Farm Equipment Mechanic I	624.281	2
52	363	Soft-Water Serviceman	862.884	2
53	1211	Diesel Mechanic	625.281	2
54	572	Precision Lens Grinder	675.380	2
55	193	Machine Set-Up Operator	600.380	2
56	390	Stationary Engineer	950.782	2
57	219	Sewing-Machine Repairman	639.281	2
58	544	Manipulator	613.782	2
59	262	Spar Mechanic	709.281	2
60	339	Aircraft Mechanic, Rigging and Controls	801.381	3
61	679	Welder, Gas Shielded Arc	810-884	3
62	568	Web Press Man	651.782	3
63	708	Packaging Machine Mechanic	920.280	3
64	569	Printer-Slotter Operator	651.782	3
[b]65	704	Cargo Agent	912.368	3
66	217	Scale Mechanic	633.281	3
67	196	Grinder, Set-Up Operator, External	603.782	3
68	734	Water Treatment Plant Operator	954.782	3
69	391	Crew Leader-Power House	952.262	3

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
70	385	Production Foreman	939.131	3
71	567	Offset Webb Press Man	651.782	3
72	919	Screw Machine Set-Up Operator, Jobbing	604.380	3
73	732	Substation Operator	952.782	3
74	1110	Customer-Engineering Specialist	828.281	3
75	260	Precision Assembly Mechanic	706.381	3
76	867	Inspector, Assemblies and Installation	806.381	3
[b]77	812	Refrigeration Mechanic	637.281	3
[b]78	279	Inspector, Finished Goods	724.884	3
79	838	Mine Machinery Mechanic	620.281	3
80	973	Foundrinier-Machine Tender	539.782	3
81	553	Aircraft and Engine Mechanic	621.281	3
82	201	Balancing-Machine Operator	609.782	3
83	142	Foundrinier-Machine Tender	539.782	3
84	152	Ammonium Nitrate Crystallizer	553.885	3
85	171	Tubemill Operator	570.885	3
86	205	Punch-Press Operator	615.782	3
87	546	Punch-Press Operator	615.782	3
88	198	Broaching Machine Set-Up Operator	605.782	3
89	455	Offset-Duplicating Machine Operator	207.782	3
90	157	Compressor	556.782	3
91	539	Forming-Machine Upkeep Man	575.380	3
92	547	Welder, Pipe-Making	616.280	3
93	510	Die-Casting-Machine Operator	514.885	3
94	331	Edge Shaper	788.885	3
95	1160	Machinery Erector	638.281	3
96	669	Boilermaker I	805.281	4
97	587	Knitting Machine Fixer	689.280	4
98	1134	Millwright	638.281	4
99	199	Boring-Mill Set-Up Operator, Horizontal	606.280	4
100	541	Machinist I	600.280	4
101	213	Boat Mechanic	623.281	4
102	222	Bag Machine Adjuster	649.780	4
103	736	Transferer I	972.381	4
104	530	Stillman	542.280	4
105	559	Maintenance Mechanic II	638.281	4
106	1293	Laboratory Technician	019.281	4
107	215	Powder-Line Repairman	629.281	4
108	687	Electrical Appliance Serviceman	827.281	4
109	701	Maintenance Man, Building	899.381	4
110	739	Stereotyper	975.782	4

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
111	223	Flexographic Pressman I	651.782	4
112	1090	Maintenance Superintendent	189.131	6
17 Occupations in Stationary Machine/Equipment Tending, Feeding, and Offbearing				
1	221	Sealing-Machine Operator	641.885	0
2	711	Container Maker-Filler-Packer Operator	920.885	0
3	1209	Hammer-Mill Operator	413.885	0
4	1389	Label Machine Operator	234.582	0
5	242	Braiding-Machine Operator	689.885	0
6	244	Creeler	689.887	0
7	836	Hay-Mill Man	413.885	0
8	170	Glue Spreader, Veneer	569.885	0
9	238	Spinner, Frame	682.885	0
10	578	Spinner, Ring Frame	682.885	0
11	231	Cut-Off Sawyer	667.885	0
12	575	Card Tender	680.885	0
13	710	Wrapping Machine Operator	920.885	0
14	125	Crushing-Machine Operator	521.885	0
15	699	Dry Cleaner	362.782	0
16	969	Carrousel Operator	363.885	0
17	124	Sorting-Machine Operator	521.885	0
18	1001	Twister Tender	681.885	0
19	1003	Packager, Machine	920.885	0
20	1029	Assembler, Oil Filter	739.887	0
21	183	Brim-And-Crown Presser	583.885	0
22	129	Blanching-Machine Operator	523.885	0
23	996	Pants Presser	363.885	0
24	1207	Tumbler Operator	369.885	0
25	179	Tumbler Tender	581.885	0
26	499	Flatwork Finisher	363.886	0
27	347	Bread Chopper	821.885	0
28	1027	Heat Treater	504.782	0
29	149	Extractor Operator, Solvent Process	551.885	0
30	154	Drier Operator	553.885	0
31	305	Bit Bender	752.884	0
32	592	Doffer	689.886	0
33	288	Formica Trim Assembler	732.884	0
34	302	Putty Glazer	749.884	0
35	158	Injection-Molding-Machine Tender	556.885	0
36	599	Die-Cutter	699.782	0
37	204	Die Heat Man; Die Header	614.886	0
38	511	Floor and Bench Molder	518.381	0
39	270	Metal Finisher	712.884	0

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
40	166	Frame Stripper	559.885	1
41	893	Spooler Operator	689.886	1
42	186	Trimmer	585.885	1
43	241	Strip-Cutting-Machine Operator	686.885	1
44	243	Garnetter	689.885	1
45	375	Packager, Machine	920.885	1
46	220	Corner Cutter	640.885	1
47	576	Yarn Winder	681.885	1
48	208	Punch-Press Operator II	617.885	1
49	143	Screenman	541.885	1
50	383	Grain Elevator Man	929.883	1
51	118	Chipping Machine Operator	520.885	1
52	234	Blocker, Automatic	673.885	1
53	247	Electrical Assembler	690.885	1
54	114	Thimble Press Operator	515.885	1
55	892	Body Maker	616.885	1
56	1262	Weigher	224.885	1
57	181	Conditioner Tender	582.885	1
58	108	Induction-Machine Operator	504.885	1
59	189	Boarding-Machine Operator	569.885	1
60	173	Spray-Machine Operator	574.782	1
61	191	Firer	590.885	1
62	137	Noodle Maker	529.885	1
63	177	Silver Stripper, Machine	579.885	1
64	141	Paraffiner Operator	534.885	1
65	109	Production Operator	505.887	1
66	332	Bottom Ironer, Machine	788.885	1
67	1077	Blocker	363.684	1
68	1023	Dry Cleaning Presser	363.782	1
69	161	Twitchell Operator	558.885	1
70	164	Acid Maker	559.782	1
71	172	Kiln Burner	573.782	1
72	106	Plater	501.885	1
73	180	Cloth Bleaching-Range Middleman	582.885	1
74	1185	Feeder Operator, Automatic	413.585	1
75	1237	Set-Up Man	224.685	1
76	146	Banbury-Mixer Operator	550.782	1
77	147	Dye Weigher	550.884	1
78	248	Filler	690.885	1
79	153	Flaker Operator	553.885	1
80	117	Dividing-Machine Operator	520.885	1
81	184	Glove Turner and Former, Automatic	583.886	1
82	293	Seal Press Assembler	733.887	1
83	299	Assembler, Small Products	739.887	1

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
84	1057	Insulation Worker	863.884	1
85	203	Silversmith Helper	613.885	2
86	602	Coil Winder II	706.884	2
87	252	Assembler Machine Operator	692.885	3
88	123	Meat Grinder	521.885	3
89	155	Coater	554.782	3
90	126	Masher	522.782	3
91	110	Process Equipment Operator	509.885	3
[b]92	263	Dental Ceramist	712.281	3
93	151	Batch-Still Operator I	552.885	3
94	169	Treating Engineer	561.782	3
95	168	Dope-Dry-House Operator	559.885	3
96	225	Folding-Machine Operator	653.782	4
97	256	Polisher	700.884	4
98	140	Bleacher Man, Pulp	533.782	4
18 Routine Object/Material Handling and Cleaning Occupations				
1	237	Utility Man	681.887	0
2	187	Duster	587.885	0
3	103	Fisherman	431.884	0
4	96	Light Cleaner	389.887	0
5	1074	Maid, Hospital	323.887	0
6	998	Overhead Cleaner	381.887	0
7	942	Folder	363.887	0
8	504	Building Custodian	381.887	0
9	135	Sorter, Agricultural Produce	529.687	0
10	91	Glove Former	363.887	0
11	975	Molded-Goods Inspector-Trimmer	759.687	0
12	1107	Tree Pruner	441.887	0
13	1135	Plastic Trimmer	712.887	0
14	132	Egg Puller	525.884	0
15	97	Farm Hand, Vegetable II	403.887	0
16	715	Candy Packer	920.887	0
17	719	Apple Packer	920.887	0
18	523	Cannery Worker	529.886	0
19	377	Labeler	920.886	0
20	1339	Mail Clerk	231.588	0
21	283	Paraffin Tank Operator	727.887	0
22	726	Hay Stacker	421.887	0
23	508	Laborer, General	509.886	0
24	295	Bead Stringer	735.884	0
25	655	Silver Wrapper	318.887	0
26	538	Sorter	573.687	0
27	561	Paper Sorter and Counter	649.687	0

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
28	90	Assembler, Wet Wash	361.687	0
29	1025	Clean-Up Man	381.887	0
30	1129	Dry Cleaner	362.782	0
31	1072	Yardman	304.887	0
32	92	Starchwork Folder	369.782	0
33	859	Messman	350.878	0
34	1124	Day Worker	301.887	0
35	667	Folder, Hand	794.887	1
36	672	Maid	323.887	1
37	1206	Washer	361.887	1
38	514	Peanut Sorter	521.887	1
39	297	Inspector-Packer	739.687	1
40	657	Fettler	779.884	1
41	258	Chemical-Milling Scriber	704.887	1
[b]42	725	Animal Caretaker	419.884	1
43	301	Decorator	740.884	1
44	396	Checker-Packager	970.381	1
45	315	Mirror Inspector, Face Cleaner Tailer and Examiner	775.687	1
[b]46	210	Four Slide Machine Operator	619.885	1
47	520	Egg Candler	529.687	1
48	720	Garment Packer	920.887	1
49	583	Pairer	684.687	1
[b]50	533	Injection-Molding Machine Operator	556.885	1
51	267	Polisher, Hand	711.884	1
52	648	Decorator, Hand	740.884	1
53	638	Finisher, Hand	731.887	1
54	668	Houseman	363.887	1
55	577	Porter I	381.887	1
56	652	Pantrygirl	317.884	2
[b]57	292	Typesetter	733.381	2
58	224	Wallpaper-Printer Helper	652.887	3
59	251	Dynamite-Cartridge Crimper	692.885	3
60	369	Switchman	910.884	3
61	395	Film Inspector I	969.687	3
62	1161	Inspector, Dental Equipment	712.887	3
63	722	Sausage Packer	920.887	3
[b]64	192	Impregnating Tank Operator I	599.885	3
65	61	Shipping Clerk II	222.587	3
66	378	Shipping Processor	920.887	3

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
19 Occupations in Mechanized Equipment and Vehicle Operation				
1	379	Fork-Lift-Truck Operator	921.883	0
2	389	Log Stacker Operator	942.883	0
3	317	Power-Shovel Operator	779.883	0
4	357	Operating Engineer II	859.883	0
5	355	Scraper Operator	850.883	0
6	101	Feeder	919.883	0
7	98	Farm Hand	404.883	0
8	999	Cranberry Farm Hand	404.884	0
9	556	Messenger	230.878	0
[b]10	970	Security Inspector	372.388	0
[b]11	1337	Weigh-Out Man	224.487	0
12	826	Salesman-Driver, Laundry	292.358	0
13	880	Route Supervisor, Laundry	292.138	0
14	860	Chauffeur	359.873	0
15	371	Chauffeur	913.883	1
16	512	Sand-Slinger Operator	518.883	1
17	837	Tractor Driver	401.883	1
18	630	Salesman, Driver	292.358	1
19	368	Truck Driver	909.883	1
20	864	Combine Operator	401.883	1
21	380	Locomotive Crane Operator	921.883	3
22	727	Gasoline Truck Operator	922.883	3
23	102	Farm Hand, General	421.883	3
24	501	Fire Fighter	373.884	3
25	828	Delivery Man	299.873	3
26	374	Routeman	919.883	3
[b]27	980	Water Serviceman	168.284	3
20 Electricians, Electronic Technicians, and Related Occupations				
1	265	Solderer	710.884	1
2	759	Electrical Control Assembler	729.884	1
3	629	Electronics Assembler	726.781	1
4	275	Electronic-Sensing Equipment Assembler	716.884	1
5	282	Semiconductor Assembler	726.884	1
6	615	Television Service and Repairman	720.281	2
7	685	Electrician	824.281	2
8	393	Patrolman (light, heat, and power)	959.387	2
9	1214	Radio Mechanic	823.281	3
10	402	Electronic Technician	003.181	3

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
11	627	Inspector, Subassemblies (Elec.)	726.384	3
12	272	Maintenance Man, Factory or Mill	714.281	3
13	617	Electric Motor Assembler	721.884	3
14	1109	Assembler Microwave Tube	725.884	3
15	349	Aircraft Mechanic, Electrical	825.281	3
16	351	Electrician A	828.281	4
17	348	Senior Communications Electrician	822.131	4
18	626	Foreman, Electrical Assemblies	126.130	4
19	683	Lineman, Repair	821.381	4
20	386	Playback Operator	939.782	5
21	688	Electronics Mechanic	828.281	5
22	1390	Chief Test Engineer	003.021	5
21 Occupations in Food Processing/Preparation				
1	82	Meat Cutter	316.884	0
2	938	Preparation Man	316.884	0
3	717	Cellophane Wrapper, Hand	920.887	0
4	119	Mixer, Dry Food Products	520.885	0
5	122	Egg-Breaking Machine Operator	521.885	0
6	381	Warehouseman	922.487	0
7	516	Laborer, Bakery	524.381	0
8	884	Bread Girl	317.884	0
9	1081	Housekeeper	306.878	0
10	1045	Domestic Cook	305.281	0
11	992	Short Order Cook	314.381	0
12	491	Food Service Worker II	317.884	0
13	965	Cook-Server	315.381	0
14	131	Fish Cleaner	525.884	1
15	127	Leadman	522.887	1
16	80	Cook	313.381	1
17	650	Short Order Cook	314.381	1
18	1099	Pastry Chef	313.131	1
19	649	Baker	526.781	2
20	644	Chef	313.131	2
21	120	Seasoning Mixer	520.887	3
22	1019	Cook Helper	313.884	3
23	1022	Dietary Aide II	355.884	3
24	1073	Modified Diet Cook	313.381	3
25	1151	School Lunch Supervisor	313.131	3

Table 19 (continued)

Observation	ID	Title	DOT Code	Scale Score
26	1046	Satellite-Manager	313.467	3
27	136	Dairy Processing Equipment Operator	529.782	3
28	518	Baker	526.781	3
29	1125	School Food Service Coordinator	313.131	3
30	911	Head Salad Girl	317.138	3
31	651	Butcher, Head	316.781	4
32	830	Kitchen Supervisor	319.134	4
33	1158	Foreman, Cattle (Feed Prep.)	413.138	4

[a]This job was inappropriately rated on the Education Level and Job-related Preparation Scale.

[b]This job was judged as not belonging to this cluster.

[c]As a result of a clerical error, this job was inappropriately included in this cluster.

The Education Level and Job-Related Preparation Scale and the *OAI Work Elements Used to Construct the Scale*

Education Level and Job-Related Preparation Scale

0 - Less than an 8th-grade education

1 - 8 to 12 years of education (without a high school diploma) and up to 6 months of job-related preparation

2 - 8 to 12 years of education (without a high school diploma) and more than 6 months of job-related preparation

3 - A high school diploma and less than 1 year of job-related preparation

4 - A high school diploma and 1 year or more of job-related preparation

5 - 2 to 4 years of college (without a degree)

6 - A bachelor's degree (B.S., B.A., A.B., etc.)

7 - A graduate degree (M.S., M.Ed., Ph.D., D.D.S., M.D., Ed.D., L.L.D., D.V.M., etc.)

OAI Work Elements Used to Construct the Scale[a]

39m. (*)____Educational level: Indicate the amount of formal education (public and private schools, colleges, and universities) typically required for entry into this job. Do not consider specific vocational preparation (vocational education, apprentice training, in-plant training, etc.) in this rating.

0 - Less than an 8th-grade education

1 - 8 to 12 years of education (without a high school diploma)

2 - A high school diploma

3 - 2 to 4 years of college (without a degree)

4 - A bachelor's degree (B.S., B.A., A.B., etc.)

5 - A graduate degree (M.S., M.Ed., Ph.D., D.D.S., M.D., Ed.D., L.L.D., D.V.M., etc.)

40m. (*)____Job-related preparation: Indicate the amount of specific vocational preparation (vocational and technical school, apprentice training, in-plant training, on-the-job training, etc.) required for adequate performance of the job. Do not include degree-granting programs (medical school, dental school, engineering school, etc.) or career progression (previously held jobs) in this rating.

0 - None or short demonstration only

1 - 1 to 30 days

2 - 1 to 6 months

3 - Over 6 but less than 12 months

4 - 1 to 2 years

5 - Over 2 years

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[a]The entire OAI is presented in Cunningham et al. (1971).

Table 20

Rate and Standard Deviation for Each of the 31 Share Clusters on 117 Old Bank Examiner Reviews

Bank Number	Cluster 1		Cluster 2		Cluster 3		Cluster 4		Cluster 5		Cluster 6		Cluster 7		Cluster 8		Cluster 9		Cluster 10		Cluster 11		Cluster 12		Cluster 13		Cluster 14		Cluster 15		Cluster 16		Cluster 17		Cluster 18		Cluster 19		Cluster 20		Cluster 21	
	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S
1	.19	.39	.08	.24	.03	.20	.15	.33	.06	.20	1.00	1.00	1.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2	1.00	.00	1.00	.00	1.00	.00	1.00	.00	.05	.22	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4	.13	.34	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5	.17	.38	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
7	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
9	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
10	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
11	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
12	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
13	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
14	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
15	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
18	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
19	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
20	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
21	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
22	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
29	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
30	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
31	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
32	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
33	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
34	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
35	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
36	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
37	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
38	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
39	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
40	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
41	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
42	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
43	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
44	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
45	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
46	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
47	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
48	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
49	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
50	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
51	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
52	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
53	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
54	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
55	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
56	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
57	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
58	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
59	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
60	.19	.39	.12	.33	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

153

152

Table IV (continued)

Item Number	Cluster 1 β_{ij}	Cluster 2 β_{ij}	Cluster 3 β_{ij}	Cluster 4 β_{ij}	Cluster 5 β_{ij}	Cluster 6 β_{ij}	Cluster 7 β_{ij}	Cluster 8 β_{ij}	Cluster 9 β_{ij}	Cluster 10 β_{ij}	Cluster 11 β_{ij}	Cluster 12 β_{ij}	Cluster 13 β_{ij}	Cluster 14 β_{ij}	Cluster 15 β_{ij}	Cluster 16 β_{ij}	Cluster 17 β_{ij}	Cluster 18 β_{ij}	Cluster 19 β_{ij}	Cluster 20 β_{ij}
1	.160	.400	.251	.638	.263	.370	.661	.000	.330	.821	.000	.000	1.000	1.000	.000	1.000	.000	.000	.000	.000
2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
5	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
6	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
7	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
8	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
9	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
10	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
11	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
12	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
13	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
14	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
15	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
16	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
17	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
18	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
19	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
20	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
21	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
22	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
23	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
24	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
25	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
26	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
27	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
28	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
29	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
30	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
31	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
32	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
33	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
34	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
35	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
36	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
37	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
38	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
39	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
40	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
41	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
42	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
43	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
44	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
45	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
46	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
47	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
48	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
49	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
50	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
51	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
52	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
53	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
54	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
55	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
56	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
57	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
58	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
59	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
60	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
61	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
62	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
63	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
64	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
65	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
66	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
67	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
68	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
69	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
70	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
71	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
72	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
73	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
74	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
75	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
76	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
77	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
78	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
79	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
80	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
81	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
82	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
83	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
84	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
85	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
86	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
87	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
88	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
89	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
90	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
91	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
92	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
93	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
94	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
95	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
96	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
97	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
98	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
99	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
100	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
101	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
102	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
103	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
104	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
105	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
106	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
107	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
108	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
109	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
110	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
111	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
112	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
113	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
114	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
115	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
116	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
117	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
118	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
119	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
120	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Table 21

Standardized Mean Scores for Each of the 21 Macro Clusters on 117 Oil Work Dimensions (Factors)[a]

Work Dimension	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8	Cluster 9	Cluster 10	Cluster 11	Cluster 12	Cluster 13	Cluster 14	Cluster 15	Cluster 16	Cluster 17	Cluster 18	Cluster 19	Cluster 20	Cluster 21
1	-.331	-.417	-.413	-.383	-.410	1.198	1.670	-.396	-.262	-.449	-.537	-.483	-.444	-.331	-.441	.387	-.355	-.310	-.380	3.787	-.337
2	2.037	1.475	1.496	-.461	-.116	1.479	.864	.722	.771	-.073	-.018	-.586	-.181	-1.286	-.027	-.598	-1.188	-1.384	-1.131	-.312	-.343
3	-.386	-.395	-.336	-.216	-.433	-.032	-.373	-.016	-.392	-.396	-.619	-.361	1.736	-.447	-.447	-.461	-.639	-.443	-.417	-.665	-.447
4	-.035	-.422	-.350	-.358	-.461	-.083	.864	6.012	-.406	-.635	-.481	-.432	1.172	-.459	-.461	-.369	-.461	-.404	-.321	-.642	-.461
5	-.060	-.461	-.369	-.433	-.388	-.499	-.169	-.176	-.291	6.360	-.467	-.379	-.019	-.261	-.467	-.345	-.639	-.379	-.345	-.282	-.282
6	-.498	-.488	-.706	-.733	-.366	1.005	1.639	-.267	-.486	-.407	-.965	-.611	-.491	-.219	-.183	3.062	-.506	-.757	-.587	-.349	-.381
7	-.865	-1.075	-.382	-1.366	-.391	2.187	-.726	-.316	-.453	-.616	-1.328	1.740	-.526	-.578	1.496	1.336	-.181	-.224	-1.010	-.298	-.578
8	-.368	-.792	-.384	-.088	-.408	2.232	-.308	-.184	-.302	-.887	-.827	2.035	-.670	-.330	1.571	-.782	-.639	-.726	-.630	1.588	-.788
9	1.819	-.976	.787	1.385	-.893	-.348	.865	.825	2.785	.883	.453	.873	-.199	-.954	-.967	-.838	-.999	-.984	-.695	-.739	-.648
10	-.205	-.364	.166	-.845	-.364	.364	.364	-.364	-.133	.231	6.466	-.816	-.364	-.364	-.364	-.364	-.364	-.364	-.364	-.364	-.364
11	2.491	2.485	-.344	-.307	-.135	-.986	-.516	-.258	-.112	-.649	-.603	-.112	-.778	-.930	-.960	-.886	-.918	-.891	-.894	-.253	-.751
12	-.303	-.396	.280	-.234	-.423	-.326	-.282	-.332	2.130	-.365	-.423	-.318	3.763	-.423	-.423	-.416	-.423	-.423	-.355	-.423	-.011
13	-.159	-.495	-.408	-.350	-.440	3.260	1.886	-.178	-.565	-.621	-.621	-.129	-.519	-.495	-.367	1.733	-.539	-.609	-.503	-.003	-.560
14	-.840	-.797	-.676	-.807	-.512	-.950	-.526	-.164	-.460	-.788	-.807	1.828	-.617	1.676	2.289	-.626	-.361	-.591	-.556	1.435	-.716
15	-.333	-.343	-.083	-.317	-.586	-.108	-.640	-.226	1.579	-.230	-.586	-.321	1.611	-.340	-.334	-.543	-.656	-.649	-.496	-.566	3.483
16	-.658	-.409	-.408	-.136	-.453	-.180	-.351	3.963	-.411	-.635	-.635	-.453	1.536	-.455	-.453	-.307	-.635	-.635	-.360	-.635	-.455
17	-.088	-.086	2.829	-.199	-.464	-.271	-.626	-.093	-.183	2.436	-.226	-.999	-.161	-.801	-.913	-.782	-.883	-.833	-.735	-.886	-.580
18	-.357	-.621	-.331	-.089	-.080	3.932	-.033	-.178	-.525	-.687	-.978	-.033	-.082	-.388	-.208	-.353	-.039	-.800	-.734	-.803	-.381
19	-.707	-.464	-.088	-.198	-.422	-.032	-.216	-.031	3.932	-.376	-.970	-.253	-.076	-.678	-.673	-.812	-.783	-.678	-.703	-.399	-.550
20	1.373	1.030	-.763	-1.115	-.166	2.383	1.079	-.910	-.522	-.607	-.277	-.701	-.470	-1.291	-.094	-.253	-1.136	-1.687	-1.259	-.352	-.393
21	2.480	-.790	-.819	-.228	-1.074	1.562	-.320	-.993	1.656	-.438	-.031	-.533	-.031	-1.090	-.332	-.361	-1.330	-1.228	-.988	-.279	-.612
22	-.973	-1.125	-.476	-.407	-.847	1.543	-.926	-.786	-.420	-.872	-1.216	1.982	-.497	-.108	1.301	-.999	-1.166	-.859	-.267	1.446	-.834
23	2.230	-.170	-.192	-.984	-.799	2.047	-.536	1.138	-.861	-.678	-.992	-.883	-.366	-.977	-.365	-.536	-1.111	-1.073	-.843	-.196	-.564
24	2.228	1.872	1.082	-.252	-.828	1.433	-.675	-.575	-.672	-.597	-.349	-.463	-.430	-1.230	-.537	-.455	-1.303	-1.092	-.968	-.287	-.735
25	-.302	-.394	-.125	-.716	-.606	-.763	-.395	-.181	-.227	-.236	-.032	6.112	-.288	-.446	-.076	-.288	-.707	-.376	-.653	-.327	-.197
26	3.163	-.398	-.634	-.169	-.766	1.447	-.588	-.183	1.099	-.418	-.056	-.657	-.491	-1.099	-.918	-.708	-.983	-.967	-.967	-.519	-.561
27	1.726	-.668	1.168	1.782	-.871	-.667	-.588	-.379	2.451	-.533	-.131	-.136	-.045	-.953	-.908	-.737	-.896	-.889	-.736	-.672	-.588
28	1.648	-.685	-.660	-.978	-.587	1.583	1.148	1.617	1.187	-.971	-.968	-.963	-.386	-.838	-.717	-.259	-1.779	-1.389	-.780	-.938	-.900
29	2.387	-.368	-.685	-.787	-1.031	1.897	-.999	1.338	1.186	-.636	-.187	-.251	-.112	-.988	-.688	-.182	-1.718	-1.180	-.733	-.200	-.663
30	-.761	-.579	-.793	-.695	-.601	-.533	-.316	-.080	-.325	-.308	-1.051	-.840	-.657	-.136	3.120	2.673	-.180	-.743	-.270	-.844	-.080
31	-.641	-.309	-.363	-.311	-.767	-.408	-.148	3.686	-.303	-.151	-.336	-.515	1.190	-.693	-.263	-.327	-.613	-.186	2.132	-.509	-.344
32	-.988	-.625	-.588	-.022	-.453	-.278	-.583	-.118	3.883	-.199	-.728	-.193	1.910	-.213	-.021	-.206	-.633	-.618	-.383	-.846	-.138
33	-.758	-.765	-.697	-.643	-.643	-.707	-.705	-.011	-.288	-.388	-.728	-.693	-.586	-.149	-.332	1.986	-.232	-.648	-.230	3.571	-.641
34	-.850	-.888	-.733	-.988	-.615	1.636	-.109	-.675	-.785	-.363	-.991	-.294	-.699	-.946	-.263	-.537	1.068	-.798	-.737	-.626	2.099
35	-.681	-.637	-.381	-.586	-.253	-.153	-.586	-.069	-.285	-.680	-.588	-.873	-.363	-.710	6.173	-.185	-.380	-.627	-.211	-.185	-.627
36	-.753	-.776	-.671	-.861	-.525	-.379	-.861	-.091	-.038	-.271	-.861	1.663	-.312	3.588	-.289	-.627	-.514	-.373	-.615	-.273	-.307
37	-.718	-.636	-.133	-.325	-.585	-.536	1.388	-.096	-.636	-.329	-.636	-.753	-.526	-.339	-.269	-.235	-.697	-.736	3.693	-.317	-.213
38	-.390	-.661	-.586	-.711	-.589	-.008	-.711	-.630	-.362	-.392	-.137	-.668	-.366	-.130	6.586	-.793	-.187	-.368	-.362	-.362	-.291
39	-.688	-.688	-.688	-.688	-.588	1.367	3.827	-.688	-.350	-.350	-.993	-.701	-.051	-.513	-.894	-.846	-.986	-.781	-.290	-.108	-.330
40	-.263	-.844	-.667	-.844	-.893	-.205	-.593	-.844	-.637	-.844	-.844	1.986	-.298	2.836	-.929	1.062	-.810	-.589	-.844	-.312	-.490
41	-.896	-.680	-.810	-.781	-.082	-.372	-.772	-.606	-.586	-.189	-1.151	-.944	-.221	-.181	-.158	1.073	3.583	-.093	-.593	-.600	-.397
42	-.623	-.751	-.696	-.751	-.367	-.680	-.751	-.671	-.176	-.395	-.751	1.510	-.751	-.276	2.099	2.275	1.867	-.642	-.657	-.113	-.393
43	-.580	-.639	-.639	-.639	-.639	-.419	-.639	-.639	3.491	-.727	-.639	-.639	2.268	-.639	-.639	-.479	-.639	-.639	-.165	-.639	-.639
44	-.603	-.603	-.603	-.603	-.263	-.603	-.603	-.603	-.116	-.603	-.382	-.603	-.084	-.126	-.126	-.126	-.126	-.126	-.278	-.369	6.370
45	-.699	-.701	-.881	-.900	-.762	-.589	1.270	-.917	-.482	-.373	-.782	-.762	-.759	-.373	3.394	-.367	-.767	-.365	-.881	-.762	-.900
46	-1.149	-1.091	-1.039	-1.173	-.537	-.195	-.944	-.884	-.580	-.236	-1.309	-.286	-.146	-.903	2.627	1.373	-.040	-.146	-.370	1.514	-.745
47	-.696	-.696	-.696	-.696	-.696	-.256	-.696	-.635	-.696	-.696	-.696	-.696	-.696	2.280	3.308	-.963	-.153	-.189	-.696	-.696	-.696
48	-1.087	-1.231	-.549	-1.421	-.991	2.137	-.036	-.899	-.071	-.698	-1.755	-.137	-.226	-.002	-.613	-.963	-.215	-.085	-1.121	1.199	1.443
49	-.833	-.809	-.502	-.614	-.488	-.345	-.230	-.114	-.241	-.197	-.715	-.715	-.299	-.298	-.313	-.185	2.079	-.625	-.715	-.863	3.513
50	-.963	-.873	-.833	-.996	-.442	-.180	-.963	-.144	-.963	-.024	-1.053	2.508	-.193	-.681	2.983	-.963	-.963	-.365	-.107	-.963	1.006
51	-.989	-.703	-.732	-.397	-.496	-.318	3.293	-.489	-.352	1.216	-.887	-.002	-.581	-.025	-.081	-.963	-.216	-.782	1.496	-.272	-.097
52	-.768	-.768	-.537	-.768	-.768	-.366	-.768	2.643	-.673	1.300	-.768	-.768	-.061	-.336	2.225	-.061	-.911	-.208	1.608	-.190	-.768
53	-.333	-.384	-.327	-.128	-.600	-.365	-.136	-.385	-.670	-.236	-.600	-.600	6.294	-.600	-.600	-.377	-.381	-.333	-.071	-.363	-.207
54	-.367	-.574	-.379	-.529	-.620	-.107	-.552	-.106	-.336	-.397	-.611	-.511	-.368	-.056	2.637	-.460	-.329	-.625	-.670	1.938	-.175
55	-.448	-.606	-.475	-.649	-.311	-.782	-.113	-.293	-.089	-.487	-.586	-.062	-.612	-.063	-.146	-.382	-.266	-.693	-.645	4.202	-.339
56	-.388	-.771	-.633	-.996	-.295	-.703	-.627	-.315	-.321	-.527	-.696	-.067	-.569	1.918	1.700	1.161	-.251	-.488	-.371	2.064	-.526
57	-.960	-.888	-.301	-.916	-.719	-.489	-.981	-.296	-.056	-.969	-1.248	-.655	1.059	-.056	-.069	-.260	-.222	2.195	-.165	-.635	2.673
58	-1.044	-.697	-1.336	-1.253	-.580	-.623	-.765	-.653	-.119	-.120	-.768	-.135	-.068	1.285	1.952	1.510	-.639	-.193	-.572	1.793	-.225
59	-.743	-.788	-.697	-.413	-.601	-.911	1.263	1.676	-.266	-.911	-.911	-.911	2.323	-.562	1.662	-.305	-.632	-.128	1.682	-.911	-.072
60	-1.158	-.847	-.816	-.257	-.920	-.846	1.487	-.692	-.170	-.016	-.852	-.751	1.256	-.069	1.065	1.102	-.649	-.366	2.711	-.917	-.026
61	-1.071	-.708	-.776	-.507	-.891	-.536	1.893	-.536	-.138	-.388	-.536	-.631	-.546	-.126	1.638	1.039	-.610	-.593	3.046	-.092	-.379
62	-1.176	-1.096	-.862	-.173	-.349	-.764	-.872	-.675	-.388	-.377	-1.408	-.968	1.197	-.170	2.862	1.281	-.084	-.195	-.730	-.051	-.826
63	-.987	-.837	-.768	-1.260	-.378	-.287	-.846	2.021	-.343	-.739	-1.260	-1.001	-.782	-.582	2.030	1.215	-.296	-.176	-.632	-.563	-.176
64	1.759	-.922	-.968	-.381	-.230	1.360	1.267	-.919	1.111	-.294	-.115	-.082	-.115	-.044	-.125	-.754	1.467	-.667	-.088	-.363	-.493
65	1.693	2.536	-.886	-.123	-.736	1.467	-.647	-.088	-.363	-.493	-.007	-.306	-.365	-1.196	-.984	-.731	-.999	-1.131	-1.112	-.712	-.686
66	-.636	-.256	-.362	-.761	-.559	2.060	1.312	-.261	-.033	-.796	-.220	2.389	-.480	-.730	-.092	-.397	-.765	-.701	-.765	-.596	-.726
67	1.987	2.013	-.327	-.601	-.105	2.389	-.601	-.196	-.601	-.601	-.601	-.601	-.601	-.601	-.601	-.348	-.601	-.601	-.601	-.013	-.671
68	-.334	-.360	-.290	-.001	-.359	.077	6.417	-.048	-.201	-.363	-.084	-.601	-.039	-.612	-.201	-.217	-.379	-.377	-.176	-.252	-.252
69	-.988	1.210	-.079	-.328	-.351	-.416	-.527	-.378	-.630	-.717	-.979	3.684	-.717	-.717	-.717	-.934	-.670	-.717	-.348	-.610	-.630
70	-.559	-.062	-.633	-.806	-.736	2.641	2.401	-.199	1.328	-.726	-.881	-.386	-.399	-.783	-.607	-.616	-.791	-.821	-.644	-.692	-.676
71	-.988	3.779	-.606	-.696	-.527	-.693	-.872	-.266	-.963	-.032	-.266	-.221	-.053	-.696	-.696	-.632	-.676	-.668	-.599	-.378	-.617
72	1.601	1.363	-.856	-.649	-.097	2.613	1.122	-.986	-.356	-.355	-.911	-.361	-.331	-1.223	-.746	-.622	-1.098	-1.237	-1.163	-.186	-.696
73	1.939	-.043	-.696	-.577	-.577	2.213	-.995	-.980	1.196	-.886	-.538	-.361	-.691	-1.161	-.995	-.886	-1.180	-1.225	-1.131	-.013	-.766
74	1.710	1.509	-.966	-.363	-.679	1.501	-.486	1.057	-.725	-.932	-.180	-.075	-.186	-1.296	-1.086	-.692	-1.205	-1.306	-1.270	-.589	-.872
75	-.679	-.311	-.163	1.515	-.573	-.227	3.850	-.174	-.205	-.4..	-.397	-.369	-.631	-.610	-.610	-.323	-.951	-.610	-.440	-.505	-.296
76	2.210	-.367	-.211	-.836	-.916	-.951	-.629	2.317	1.096	-.456	-.893	-.389	-.491	-1.081	-.921	-.698	-.971	-.992	-.863	-.191	-.195
77	2.475	-.363	-.627	-.337	-.819	-.627	-.483	-.770	1.251	-.171	2.433	-.331	-.535	-.807	-.819	-.675	-.819	-.819	-.819	-.273	-.789
78	-.796	-.051	2.210	1.376	-.713	-.306	-.636	-.869	-.210	2.052	-.796	-.376	-.054	-.956	-.956	-.838	-1.000	-.956	-.642	-.728	-.058
79	-1.006	-.901	-.236	-.698	1.178	-.873	-.823	-2.608	-.732	-.646	-1.271	-1.308	-.916	1.630	-.262	-.699	1.612	-.998	1.170	-.236	-.099
80	1.646	-.580	1.327	-.731	-.962	-.761	-.660	-.211	2.613	-.187	-.789	1.255	-.166	-.970	-.830	-.818	-.962	-.962	-.776	-.097	-.082
81	-.111	-.222	-.060	-.366	-.380	-.306	-.435	-.218	4.336	-.096	-.435	-.309	-.218	-.435	-.435	-.381	-.435	-.435	-.338	-.435	-.171
82	1.757	-.896	1.161	1.067	-.935	-.648	1.637	-.785	1.295	-.313	-.129	-.338	-.227	-1.299	-1.149	-.988	-1.193	-1.218	-1.073	-.877	-.360
83	-.834	-.376	3.270	-.301	-.836	-.881	-.493	-.340	-.266	1.975	-.092	-.494	-.207	-.846	-.836	-.798	-.918	-.861	-.611	-.906	-.187
84	-.348	-.348	-.788	-.667	-.647	-.966	-.667	-.088	-.865	-.173	6.005	-.667	-.667	-.667	-.667	-.667	-.667	-.667	-.667	-.348	-.667
85	-.284	-.599	-.213	-.661	-.840	-.661	1.408	-.144	2.391	-.703	-1.276	-.338	-.330	-1.276	-.661	-.982	-1.112	-1.131	-.918	-1....	-.983
86	1.649	1.998	1.709	-.413	-.896	-.635	-.946	1.211	-.340	-.166	-.382	-.786	-.860	-1.146	-1.019	-.822	-1.075	-1.181	-1.081	-.79.	-.461
87	-.336	-.414	-.426	-.381	-.373	-.930	-.910	-.333	-.218	-.365	-.665	-.489	-.436	-.344	-.402	-.408	-.335	-.432	-.336	6.081	-.361
88	-.238	-.325	-.276	-.327	-.327	-.386	-.256	6.318	-.327	-.327	-.327	-.327	-.262	-.323	-.327	-.327	-.327	-.151	-.005	-.327	-.327
89	-.271	-.271	-.271	-.271	-.350	-.270	-.350	-.270	6.231	-.350	-.350	-.350	1.078	-.350	-.350	-.350	-.350	-.318	-.270	-.350	-.133
90	-.697	-.363	-.386	-.383	-.651	3.827	-.960	-.095	-.237	-.611	-.611	1.369	-.960	-.342	-.362	-.366	-.602	-.624	-.600	-.782	-.598
91	-.086	-.465	-.368	-.496	-.331	-.292	-.496	-.130	-.341	-.093	-.718	6.231	-.216	-.611	-.622	-.638	-.496	-.346	-.371	-.465	-.111
92	-.699	-.588	-.676	-.650	-.199	-.688	1.067	-.572	-.611	-.360	-.731	-.696	-.387	-.136	-.110	3.427	-.505	-.650	1.063	-.472	-.350
93	1.901	-.387	-.716	-.610	-.953	-.429	-.665	-.306	2.203	-.883	1.730	-.389	-.462	-1.050	-1.037	-.896	-1.039	-1.053	-.899	-.600	-.339
94	-.819	-.681	-.688	-.496	-.496	-.877	-.339	3.048	-.496	-.496	-.496	-.496	2.892	-.496	-.496	-.381	-.496	-.496	-.176	-.496	-.496
95	2.106	2.344	-.318	-.434	-.586	1.360	-.339	-.586	-.841	-.792	-.012	-.792	-.827	-.907	-.855	-.536	-.907	-.855	-.516	-.516	-.476
96	-.293	-.381	-.386	-.106	-.617	-.191	6.019	1.636	-.617	-.617	-.617	-.617	-.096	-.375	-.617	-.617	-.617	-.617	-.617	-.213	-.617
97	-.231	-.231	-.231	-.102	-.271	-.271	-.271	-.040	-.150	-.271	-.271	-.271	4.449	-.271	-.271	-.251	-.271	-.231	-.231	-.271	-.271
98	2.617	1.060	-.965	-.756	-.995	-.347	-.610	2.299	-.103	-.512	-.865	-.673	-.903	-.721	-.776	-.713	-.778	-.786	-.776	-.636	-.438
99	-.871	-.921	-.967	-.590	-.338	-.936	-.362	-.500	-.467	-.231	-.971	-.683	-.315	-.200	-.084	2.035	1.706	-.838	-.712	-.853	1.000
100	-.177	-.229	-.199	-.229	-.229	-.229	-.229	-.229	-.307	-.229	6.472	-.229	-.229	-.229	-.229	-.229	-.229	-.229	-.229	-.229	-.229
101	-.376	-.863	-.721	-.793	-.672	-.844	-.405	-.083	-.530	-.328	-.886	1.078	-.366	-.088	3.759	-.960	-.012	-.350	-.079	-.844	-.169
102	-.931	-.385	-.262	-.385	-.385	-.198	-.016	6.640	-.385	-.385	-.385	-.385	-.122	-.385	-.385	-.385	-.385	-.385	-.176	-.385	-.385
103	1.669	-.093	2.473	-.100	-.881	-.176	-.078	-.936	-.888	-.793	-.526	-.018	-.278	-1.051	-1.065	-.973	-1.058	-1.089	-.978	-.924	-.337
104	-.985	-.778	1.480	-1.065	2.398	-.313	-.716	-.522	-.511	1.532	-1.130	-.933	-.201	-.867	-.716	-.776	-.607	-.867	-.273	-.962	1.532
105	-.156	-.377	-.327	-.395	-.395	2.671	-.620	-.395	-.351	-.395	-.395	-.395	-.395	-.339	-.395	-.123	-.384	-.395	-.282	3.511	-.395
106	-.561	-.480	-.498	-.602	-.861	-.946	-.287	-.569	-.479	-.560	-.602	-.210	-.536	2.382	-.602	-.181	-.579	-.579	-.323	3.433	-.506
107	-.363	-.336	-.331	-.336	-.336	-.336	-.336	6.079	-.336	-.336	-.336	-.336	-.630	-.336	-.336	-.336	-.336	-.336	-.336	-.336	-.336
108	-.080	-.476	-.386	-.238	-.476	-.326	-.476	-.156	1.389	-.476	-.476	-.476	3.934	-.476	-.476	-.476	-.476	-.331	-.238	-.476	-.090
109	1.663	-.059	-.389	-.131	-1.011	1.428	1.036	-.845	1.343	-.334	1.316	-.756	-.252	-1.330	-.817	-.476	-1.531	-1.536	-.948	-.323	-.462
110	-.870	-.752	-.742	-.565	-.708	-.451	-.333	1.706	-.831	-.634	-.964	-.964	-.918	-.451	1.357	1.298	-.515	-.368	2.525	-.173	1.163
111	-.711	1.013	-.367	-1.261	-.993	-.588	-.551	-1.750	-.496	-.391	-1.040	-.937	-.936	1.061	-.222	-.570	1.477	-.965	-.606	1.020	-.634
112	-.822	1.006	-.696	-1.975	-.993	-.588	-.551	-1.750	-.496	-.391	-2.677	-.478	-.978	-.255	-.354	-.991	-.161	-.827	-.665	-.431	-.905
113	-.098	-.239	-.079	-.239	-.239	-.239	6.447	-.239	-.239	-.239	-.239	-.239	-.239	-.239	-.239	-.239	-.239	-.239	-.239	-.239	-.239
114	1.383	-.380	1.434	2.232	-.875	-.627	-.801	-.667	1.888	1.389	-.135	-.389	-.135	-.875	-.875	-.766	-.875	-.815	-.526	-.873	-.588
115	-.387	-.432	-.661	-.686	-.376	-.177	-.119	-.280	-.441	-.366	-.686	-.686	-.076	-.686	-.035	-.366	-.893	-.362	-.326	-.686	6.088
116	1.085	-.360	-.371	-.372	-.030	-.387	-.372	-.230	1.342	-.372	3.470	-.372	-.233	-.372	-.372	-.372	-.372	-.372	-.372	-.372	-.372
117	1.996	-.190	1.540	-.313	-.665	-.093	-.321	-.271	2.041	1.788	-.185	-.087	-.189	-.867	-.936	-.913	-.936	-.908	-.305	-.810	-.660

[a]The entries in this table were derived by standardizing the mean work-dimension scores for the 21 macro clusters, i.e., using the 21 macro clusters as the standardization sample.

APPENDIX E

MACRO-CLUSTER PROFILES ON 102 ATTRIBUTES FROM THE ATTRIBUTE REQUIREMENT INVENTORY

Table 22. Mean Standard Scores and Standard Deviations for Each of the 21 Macro Clusters on 102 Attribute-Requirement Estimates

Table 32

Mean Standard Scores and Standard Deviations for Each of the 21 Score Clusters on 100 Attribute-Requirement Estimates [a,b]

Attribute Number	Cluster 1		Cluster 2		Cluster 3		Cluster 4		Cluster 5		Cluster 6		Cluster 7		Cluster 8		Cluster 9		Cluster 10		Cluster 11		Cluster 12		Cluster 13		Cluster 14		Cluster 15		Cluster 16		Cluster 17		Cluster 18		Cluster 19		Cluster 20		Cluster 21	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
1	0.388	.366	0.260	.242	0.385	.372	0.330	.288	0.782	.675	9.660	1.010	9.060	.660	9.580	1.480	9.370	.946	0.830	.337	0.189	.097	9.108	1.189	9.389	.731	9.388	.941	10.797	1.178	10.411	1.079	9.133	.564	0.736	.462	9.960	1.088	10.477	.668	9.391	.689
2	0.611	.481	0.341	.322	0.602	.352	0.390	.329	0.846	.667	10.417	1.576	9.781	1.239	9.389	1.828	0.630	.596	0.611	.665	0.383	.189	9.282	.645	0.799	.673	9.645	.629	9.687	.788	10.573	1.139	9.858	.586	0.780	.296	9.358	.723	10.084	.886	0.810	.683
3	0.358	.486	0.638	.388	0.341	.357	9.417	.261	0.787	.640	9.423	.958	9.642	1.085	9.080	1.988	0.450	.685	0.737	.527	0.178	.171	8.742	.542	0.610	.662	9.340	.781	9.936	1.243	10.020	.997	9.788	.662	0.333	.360	0.468	.833	9.688	.639	9.288	.728
4	0.867	.619	0.659	.482	0.821	.581	9.982	.762	0.743	.566	9.283	.999	10.231	1.367	10.937	1.319	0.821	.982	0.686	1.080	0.366	.966	0.671	.835	9.367	1.159	0.986	.984	9.981	.646	10.333	1.046	9.196	.734	0.987	.998	11.351	1.325	9.131	.687	0.823	.573
5	0.313	.380	0.680	.178	0.657	.297	9.361	.880	0.739	.386	10.084	1.484	9.055	.683	0.918	.779	0.670	.665	9.365	.317	0.330	.067	9.186	.681	0.560	.593	10.083	.970	10.530	.980	10.377	1.253	0.840	.588	0.567	.343	0.60	.562	10.291	.630	0.983	.213
6	0.383	.635	0.648	.283	0.672	.384	0.638	.271	0.795	.613	10.121	1.432	9.623	1.380	9.843	.983	0.887	.583	0.672	.541	0.341	.132	9.682	.586	0.815	.668	0.884	.538	9.136	.935	10.700	1.139	9.309	.630	0.667	.336	0.388	.744	9.687	.732	9.135	.708
7	0.670	.395	0.562	.688	0.595	.644	0.682	.388	0.784	.588	10.810	1.687	10.179	1.637	9.584	.826	9.488	1.388	0.528	.645	0.284	.117	9.491	.786	9.874	.856	8.733	.569	9.326	.684	10.085	1.113	0.878	.688	0.256	.297	0.779	.659	10.384	.941	9.845	.791
8	0.862	.633	0.881	.371	0.858	.150	0.885	.237	0.844	.334	10.377	1.736	10.298	1.238	9.930	.632	9.811	.686	0.385	.230	0.611	.134	8.712	.280	0.655	.173	0.796	.584	9.888	.382	9.830	1.290	0.735	.333	0.686	.572	0.723	.679	10.788	1.668	9.748	.326
9	0.841	.961	0.845	.230	0.842	.342	0.847	.288	0.868	.684	10.868	1.828	9.344	.785	9.364	.987	0.915	.589	0.552	.689	0.760	.600	10.230	1.189	0.668	.357	0.951	.583	9.736	.589	9.373	.880	0.831	.541	0.868	.271	0.552	.372	9.743	.788	9.588	.377
10	0.888	.457	0.833	.187	0.837	.484	0.344	.181	0.848	.526	10.664	1.683	9.842	.538	9.383	.613	0.788	.618	0.843	.233	0.388	.148	10.784	1.382	0.837	.348	9.665	.838	10.785	1.235	9.845	.985	9.783	.668	0.867	.388	0.371	.288	9.984	.855	0.634	.326
11	0.348	.355	0.388	.297	0.888	.648	0.214	.888	0.735	.637	10.157	1.338	9.886	.333	9.195	.832	9.842	.895	0.882	.883	0.183	.087	9.873	1.384	0.836	.838	9.388	.988	10.338	1.183	9.738	1.284	9.298	.779	0.781	.838	0.688	.681	9.681	.762	9.725	1.093
12	0.838	.671	0.388	.377	0.878	.581	0.295	.362	0.836	.667	9.751	1.646	9.868	.383	9.388	.835	10.488	1.886	9.888	.886	0.848	.323	9.888	.788	0.858	1.133	0.621	.384	0.788	.388	9.838	.617	9.888	.888	0.888	.388	0.788	.627	9.138	.888	9.474	.838
13	9.838	.330	8.748	.888	8.888	.648	8.863	.718	0.528	.277	9.888	1.152	9.388	.894	10.883	.388	12.388	2.272	8.822	.838	8.788	.428	8.838	.338	10.731	1.877	0.385	.188	8.885	.138	8.888	.283	8.838	.233	8.388	.188	8.888	.888	8.888	.888	11.748	1.988
14	9.167	.438	9.776	.388	8.888	.648	9.138	.881	8.582	.384	9.888	1.198	9.868	.378	9.237	.483	12.888	2.488	9.852	.351	8.733	.448	8.888	.348	10.688	.981	8.541	.338	8.788	.173	8.727	.384	8.883	.178	8.888	.157	8.884	.238	8.888	.888	8.888	.888
15	9.737	.884	9.884	.788	9.344	.838	8.848	.162	8.888	.556	10.778	1.324	9.884	1.888	9.873	.832	9.861	.838	8.888	.888	8.888	.737	8.888	.787	8.888	.387	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
16	9.893	.988	9.782	.843	9.256	.677	8.322	.331	8.772	.661	10.278	1.888	9.553	.857	9.536	.884	9.171	.763	8.851	.681	8.843	.888	8.891	.888	8.848	.884	8.853	.187	8.788	.327	8.883	.673	8.113	.832	8.888	.328	8.888	.888	7.937	.888	8.888	.888
17	9.888	.778	10.197	1.879	9.331	.727	8.716	.888	8.878	.736	9.522	.888	9.567	.678	9.885	.678	9.871	.823	8.568	.388	8.888	.938	8.888	.888	8.888	.682	8.878	.188	8.152	.173	8.384	.388	8.883	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
18	10.283	.782	9.188	.787	9.128	.773	8.883	.188	8.867	.384	9.885	.938	9.483	.487	9.888	.572	9.932	.771	8.738	.384	9.128	1.168	9.888	.873	8.888	.668	8.888	.328	8.788	.383	8.823	.487	8.813	.183	7.938	.177	8.238	.283	8.853	.387	8.838	.837
19	9.988	.778	10.197	1.879	9.331	.727	8.716	.888	8.878	.736	9.522	.888	9.567	.678	9.885	.678	9.871	.823	8.568	.388	8.888	.938	8.888	.888	8.888	.682	8.878	.188	8.152	.173	8.384	.388	8.883	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
20	9.987	.837	9.889	.738	10.241	1.819	8.938	.378	8.815	.382	9.282	.887	9.154	.252	9.264	.842	9.523	.389	9.561	.843	8.988	.987	9.148	.853	8.922	.576	8.877	.258	8.178	.161	8.853	.387	8.878	.183	8.884	.285	8.388	.886	8.888	.383	8.778	.823
21	9.886	.874	8.981	.735	10.020	.886	9.215	.888	8.388	.386	9.142	.823	9.242	.438	9.245	.583	10.732	.829	9.988	.886	8.887	.886	8.835	.787	9.648	.581	9.138	.338	9.138	.123	8.382	.388	8.188	.138	8.137	.238	8.438	.384	8.888	.373	8.952	.888
22	10.189	1.888	8.788	.638	9.731	.818	9.362	.857	8.893	.241	9.284	.812	9.167	.323	9.484	.884	10.438	.922	9.334	.893	9.888	1.238	8.932	.736	9.113	.744	8.541	.213	8.388	.183	8.888	.283	8.148	.138	8.138	.178	8.381	.283	8.956	.588	8.779	.688
23	10.116	.881	8.873	.671	9.886	.888	9.736	.878	8.129	.329	9.388	.738	9.282	.437	9.838	.583	88.383	.833	8.972	.828	9.387	1.288	8.888	.781	8.882	.883	8.881	.847	8.835	.188	8.388	.188	8.388	.133	8.888	.288	8.888	.888	8.888	.888	8.773	.738
24	8.738	.982	8.872	.548	9.738	1.823	8.813	.631	8.382	.487	9.191	.738	8.888	.457	9.177	.588	10.788	.983	88.823	1.284	9.884	1.188	10.188	1.227	9.388	.877	8.384	.883	8.387	.217	8.388	.288	8.843	.386	8.387	.336	8.388	.388	8.588	.384	8.988	1.883
25	9.857	.887	8.388	.882	8.883	.838	8.838	.888	8.523	.538	10.387	1.388	10.885	1.849	9.888	.841	9.888	1.888	8.715	.781	8.828	.888	11.888	1.232	9.233	.778	9.852	.732	9.825	.883	9.882	.886	9.383	.883	8.888	.838	8.888	.888	8.867	.713	8.838	.715
26	8.833	.913	8.378	.388	8.388	.888	8.378	.888	8.888	.883	10.138	1.337	9.348	1.888	9.888	.712	9.388	1.888	8.838	.822	8.388	.888	11.888	1.873	8.888	.888	9.138	.671	9.888	.841	8.817	.881	8.888	.878	8.884	.888	8.738	.888	88.884	.878	8.883	.728
27	9.888	.798	10.148	.988	9.182	.882	8.528	.382	8.883	.838	9.788	.817	9.867	.388	9.138	.888	9.873	.888	8.432	.884	8.888	.883	8.883	.843	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
28	9.383	.888	8.883	.828	8.883	.883	8.888	.787	8.888	.838	10.879	1.384	10.881	1.878	10.384	.838	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
29	8.888	.838	8.388	.838	8.747	.731	8.981	8.81	8.782	.811	9.888	1.848	10.118	2.238	10.433	1.438	9.113	.728	9.838	1.888	8.388	.888	88.387	.887	8.788	1.171	8.888	.711	88.184	1.888	9.741	.881	8.888	.843	8.848	.888	88.387	1.838	9.817	.883	8.883	.773
30	8.838	.838	8.388	.837	8.741	.888	8.388	.231	8.888	.883	10.838	1.882	8.883	.881	8.387	.888	8.138	.887	8.838	.888	8.888	.882	11.888	1.888	8.888	.888	8.117	.888	88.138	.888	8.888	.838	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
31	8.787	.888	8.588	.888	8.888	.888	8.888	.138	8.731	.888	10.882	1.138	9.888	1.888	8.888	.888	8.138	.888	8.888	.888	8.727	.728	8.728	.728	8.847	.578	8.888	.888	8.838	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
32	10.643	.727	9.296	.783	9.321	.689	8.867	.343	1.493	.138	10.788	1.138	9.821	.863	9.848	.588	9.738	.832	8.542	.895	9.884	.896	8.728	.882	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
33	10.868	.743	9.564	.771	9.838	.744	8.882	.528	3.384	.385	10.888	1.847	9.488	.683	9.533	.888	9.881	.787	8.868	.678	9.271	1.544	8.887	.888	8.867	.638	8.838	.887	8.383	.378	8.841	.488	8.887	.883	7.886	.782	8.888	.888	8.888	.888	8.888	.888
34	10.867	.793	9.252	.818	9.488	.771	8.915	.818	8.448	.388	9.883	.886	8.691	.886	8.438	.586	9.736	.738	8.867	.887	9.388	1.336	9.113	.883	8.831	.573	8.888	.888	8.867	.884	8.873	.418	8.842	.883	7.888	.888	8.888	.888	8.888	.888	8.888	.888
35	10.193	.784	9.531	.886	9.385	.732	8.883	.582	8.556	.672	9.867	1.888	8.456	.458	9.433	.885	9.866	.713	8.848	.488	8.825	1.881	8.874	.887	8.715	.884	8.888	.888	8.733	.373	8.388	.483	8.884	.886	8.888	.888	8.888	.888	8.888	.888	8.888	.888
36	10.881	.883	9.817	.784	9.886	.784	8.887	.542	8.378	.321	9.858	.933	8.643	.371	9.388	.884	8.827	.888	8.852	.582	8.677	1.277	9.384	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
37	10.886	.895	8.817	.371	9.378	.823	8.888	.527	8.866	.387	10.127	1.873	9.235	.448	9.882	.738	9.772	.955	8.881	.377	9.678	1.172	9.878	.862	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
38	9.768	.768	8.642	.525	8.898	.888	8.534	.888	8.888	.428	10.431	1.388	9.888	1.818	88.238	.888	88.138	.971	8.577	.896	8.888	.838	8.888	.883	8.388	.882	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
39	10.138	.775	8.868	.843	9.131	.838	8.888	.888	8.888	.373	10.555	1.198	9.474	.788	9.888	.888	9.888	.938	8.438	.431	9.888	.888	8.547	.734	8.888	.838	8.138	.343	8.555	.383	8.888	.847	8.878	.213	7.887	.383	8.838	.888	8.888	.838	8.888	.888
40	10.197	.783	8.888	.553	9.888	.821	8.883	.838	8.378	.355	10.562	1.216	9.888	.782	9.883	.852	8.838	.888	8.671	.838	9.381	1.852	9.384	.728	8.878	.871	8.157	.338	8.348	.331	8.718	.343	8.887	.888	8.888	.333	8.888	.888	8.888	.888	8.888	.888
41	10.133	.921	8.788	.838	9.328	.784	8.887	.888	8.374	.381	10.389	1.198	9.122	.553	9.348	.788	9.711	.813	8.733	.832	9.883	1.887	10.881	1.888	8.872	.878	8.188	.888	8.388	.371	8.357	.883	8.138	.188	8.111	.133	8.888	.888	8.888	.888	8.888	.888
42	10.148	1.882	8.733	.818	9.761	.795	9.189	.842	8.888	.253	9.275	.857	9.888	.512	9.838	.888	10.888	.972	9.881	.982	9.388	1.838	8.888	.731	9.188	.738	8.888	.888	8.338	.188	8.338	.188	8.888	.388	8.171	.138	8.388	.188	8.888	.888	8.888	.888
43	9.893	1.267	8.582	.838	9.388	1.887	8.813	.883	8.629	.388	9.783	.842	8.888	.388	9.881	.882	9.376	.888	9.281	1.132	11.888	2.888	88.238	1.388	8.881	.484	8.788	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
44	9.788	.748	8.181	.888	9.382	1.138	8.817	.888	8.478	.312	9.338	.882	9.868	.387	9.688	.888	9.884	.728	8.887	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
45	8.388	.388	8.888	.675	8.332	.882	8.788	.882	8.783	.815	9.838	.888	88.132	1.728	9.588	1.841	9.882	.888	8.188	1.884	8.378	.883	8.888	.878	9.283	1.888	9.382	.788	10.838	1.138	10.388	1.888	9.237	.888	8.883	.388	10.738	1.888	9.888	.888	9.888	.888
46	8.842	.838	8.955	.838	8.551	.888	8.788	.823	8.782	.823	9.888	.888	9.888	.888	9.888	1.838	9.883	1.738	8.388	.888	8.888	.888	8.888	1.838	9.888	.823	8.538	.888	88.387	.883	88.183	1.888	8.888	.888	8.888	.888	9.888	.888	9.888	.888	9.888	.888
47	8.373	.888	7.988	.882	8.888	.788	8.388	1.738	8.888	.823	8.888	.888	88.878	1.742	9.838	1.888	8.887	.788	8.888	1.888	8.388	.883	8.317	.888	9.888	1.838	8.888	.888	88.888	1.888	88.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
48	8.338	.888	8.888	.888	8.813	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
49	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
50	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
51	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
52	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
53	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888

Table II (continued)

Attribute Number	Cluster 1		Cluster 2		Cluster 3		Cluster 4		Cluster 5		Cluster 6		Cluster 7		Cluster 8		Cluster 9		Cluster 10		Cluster 11		Cluster 12		Cluster 13		Cluster 14		Cluster 15		Cluster 16		Cluster 17		Cluster 18		Cluster 19		Cluster 20		Cluster 21	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
54	8.374	.389	8.357	.364	8.357	.346	8.495	.410	9.041	.453	8.833	.388	9.501	.832	10.384	1.062	9.088	.891	9.087	.636	9.333	.196	9.139	1.297	9.000	1.250	9.088	.322	11.046	2.048	9.027	.993	9.102	.576	9.191	.784	9.055	1.040	9.286	.600	9.087	.726
55	9.516	.662	9.434	.643	9.708	.789	9.057	.988	9.736	.615	9.695	.963	9.381	1.581	9.019	1.230	9.284	.905	9.322	.689	9.032	.634	8.986	.630	9.068	1.046	8.942	.940	10.574	1.731	9.732	1.088	8.882	.728	8.981	1.899	9.786	1.078	9.325	.845	9.091	.571
56	8.339	.398	8.284	.357	8.393	.328	9.732	.342	8.882	.437	8.835	.758	8.781	1.874	10.082	1.878	9.088	.726	9.833	.385	8.484	.287	8.880	1.662	10.287	1.285	9.484	1.572	9.781	.954	9.321	.571	9.284	.843	10.138	1.963	9.343	.436	9.333	.328
57	9.323	.745	9.484	.728	9.788	.672	9.288	.531	8.431	.630	10.615	1.677	9.760	1.265	9.389	.663	9.523	1.141	8.488	.288	8.683	.721	9.137	.982	8.825	.636	9.329	.988	9.211	.728	8.676	.817	8.189	.478	7.882	.989	8.388	.563	9.949	.939	8.504	.884
58	9.459	.776	9.135	.388	9.781	.684	9.988	.725	8.843	.682	9.888	1.186	10.341	1.712	10.837	1.963	9.581	.775	9.867	.823	9.286	.382	9.045	.796	10.085	1.276	9.958	.799	9.688	.860	9.987	.827	9.862	.687	9.584	.585	10.289	1.849	9.833	.686	9.849	.737
59	8.441	.675	8.176	.371	8.518	.578	8.986	.558	8.681	.588	9.793	1.162	9.738	1.538	10.188	1.618	9.434	.982	8.898	.827	8.823	.875	10.288	.882	9.288	.827	9.284	.782	10.193	.989	10.193	.862	8.938	.588	8.386	.678	9.781	.984	10.084	.618	9.165	.797
60	9.788	1.885	9.291	.288	9.888	.877	8.642	.387	8.786	.983	9.861	1.881	9.568	1.135	10.286	.782	9.468	.857	9.884	.588	8.686	1.888	13.171	1.888	9.587	.888	8.956	.888	9.215	.684	9.385	.786	8.736	.861	8.753	.788	8.887	.673	9.936	.777	9.383	.887
61	9.739	.798	9.888	.886	9.383	.786	9.332	.819	9.288	.642	9.827	1.738	10.779	.788	9.635	.688	10.288	.833	9.136	.745	9.439	1.832	9.387	.661	9.136	.888	8.887	.327	8.384	.388	8.689	.771	8.185	.439	7.888	.388	8.739	.673	9.882	.713	8.735	.788
62	9.288	.581	8.273	.327	8.479	.666	9.284	.488	8.745	.587	9.886	1.883	9.388	.873	9.538	1.284	9.786	1.388	8.817	.826	8.236	.842	8.878	.888	8.611	.838	8.686	.889	10.381	.898	10.388	.873	8.877	.677	8.735	.523	8.388	.777	10.882	.719	9.286	.877
63	8.138	.663	8.313	.412	8.378	.537	8.381	.436	8.933	.639	9.386	1.883	9.861	.927	9.886	1.488	8.943	.799	8.981	.881	7.988	.178	8.887	.883	8.386	.988	9.846	.788	10.238	1.882	10.388	.938	9.872	.717	8.884	.861	9.788	1.866	9.838	.628	9.844	.888
64	8.488	.438	8.386	.288	8.388	.664	8.388	.683	8.878	.817	9.881	1.788	9.813	1.861	9.638	1.288	8.941	.788	8.767	.838	8.178	.251	8.888	.888	8.868	.888	9.238	.715	9.888	.884	10.888	1.887	9.281	.886	8.878	.886	8.888	.888	10.337	.725	9.538	.787
65	8.888	.811	8.888	.888	9.887	.888	9.381	.833	8.388	.884	9.231	.838	9.885	.864	9.387	.588	10.888	.833	8.783	.888	9.177	.888	8.871	.817	9.478	.388	8.135	.886	8.327	.136	8.388	.886	8.135	.176	8.188	.886	8.864	.388	8.673	.864	8.878	.862
66	9.658	.881	8.738	.538	9.863	.788	9.338	.788	8.888	.128	9.887	.838	9.887	.883	9.277	.313	12.172	1.812	9.962	.716	9.888	.885	8.873	.784	10.536	.889	8.388	.236	8.367	.128	8.825	.868	8.384	.139	8.237	.883	8.388	.888	10.337	.725	9.538	.787
67	9.883	.786	10.126	1.888	9.378	.788	8.837	.788	8.873	.778	9.536	.838	9.883	.884	9.888	.315	9.388	.868	9.888	.888	8.388	.974	8.388	.788	8.867	.878	8.158	.346	8.173	.2888	8.383	.378	8.135	.888	8.864	.388	8.183	.978	8.488	.842	8.882	.337
68	8.841	.888	8.572	.638	8.888	.887	8.388	.381	8.758	.837	10.884	1.838	9.878	1.388	9.647	.726	9.888	.978	8.888	.888	8.838	.388	8.884	.884	8.888	.858	8.888	.881	9.387	.832	9.888	1.883	8.715	.883	8.877	.884	8.883	.888	10.371	.948	9.838	.758
69	8.387	.668	8.388	.887	8.887	.888	8.363	.877	8.388	.388	10.142	1.388	9.888	1.888	9.381	1.138	9.182	.884	8.882	.884	8.883	.381	9.188	.838	8.838	.867	9.384	.838	10.883	.878	10.377	1.288	8.884	.885	8.388	.384	9.373	.784	10.387	.813	9.868	.778
70	8.888	.781	8.888	.887	10.128	.888	8.115	.888	8.877	.888	9.257	.718	9.388	.888	9.383	.388	9.888	.882	8.838	.788	8.884	.883	8.882	.787	8.887	.848	8.888	.887	8.134	.188	8.238	.188	8.888	.178	7.888	.884	8.388	.388	9.738	.838
71	9.888	.788	8.883	.388	9.148	.884	9.883	.838	9.887	1.888	9.881	.848	9.885	.838	13.383	1.838	9.142	.788	8.788	.732	9.888	.838	8.888	.781	8.238	.371	8.183	.382	8.873	.838	8.884	.872	8.883	.883	8.881	.838	8.881	.838	8.888	.888	9.888	.888
72	9.838	.815	8.988	.887	9.888	1.888	8.858	.788	8.388	.881	9.838	.857	9.138	.884	9.173	.888	10.887	1.888	10.888	1.771	8.788	.778	8.878	1.238	9.384	.838	8.888	.728	8.888	.881	8.778	.538	8.382	.885	8.388	.873	8.388	.872	8.881	.888	9.883	1.888
73	10.267	.838	9.845	.888	9.653	.788	9.838	.883	9.338	.374	9.778	.918	9.388	.848	9.838	.848	9.538	.888	10.384	.888	8.883	.595	8.838	1.838	9.138	.773	9.178	.883	8.881	.736	8.388	.383	8.838	.838	8.888	.388	8.884	.388	8.888	.838	9.778	.788
74	10.212	.758	9.288	.787	9.388	.748	8.813	.538	8.888	.838	10.848	1.881	9.868	.888	9.838	.888	9.838	.682	9.781	.788	8.888	.888	9.387	1.172	8.313	.888	8.888	.578	8.868	.388	8.137	.837	8.658	.678	8.881	.388	7.882	.388	8.887	.888	8.782	.838	9.888	.888
75	10.888	.748	9.888	.782	9.388	.888	8.888	.838	8.881	.572	10.887	.883	9.887	.788	9.888	.838	9.884	.712	8.884	.888	8.888	.838	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
76	9.571	.716	8.738	.682	8.888	.888	8.383	.387	8.878	.531	10.883	1.838	9.883	1.881	9.882	.883	9.838	.788	8.882	.838	8.872	.788	8.382	.888	8.882	.888	8.882	.888	8.432	.388	8.888	.235	9.182	.888	8.738	.882	8.884	.388	8.888	.888	9.883	.888
77	9.387	.737	8.888	.338	8.878	.838	8.878	.888	8.328	.347	9.383	.882	9.838	1.888	13.882	1.882	10.888	1.888	8.887	.882	8.782	.388	8.882	.883	11.388	1.773	8.888	.782	8.888	.884	8.938	.888	8.338	.883	8.882	.883	9.388	1.887	8.983	.388	8.888	.884
78	9.788	.754	8.982	.788	8.983	.388	8.388	.788	8.872	.888	10.883	1.838	9.715	.888	9.887	.888	9.388	.883	8.887	.388	8.838	.723	9.338	.881	8.738	.382	8.874	.338	8.881	.188	8.882	.367	8.138	.888	7.888	.884	8.388	.138	8.887	.888	8.883	.888
79	10.578	.888	9.138	.781	9.883	.838	9.878	.888	8.384	.378	9.883	.888	9.138	.838	9.837	.884	8.988	.718	8.884	.888	9.382	1.848	9.178	.877	8.988	.837	8.888	.238	8.838	.215	8.138	.377	8.888	.888	7.879	.173	8.837	.873	8.847	.888	8.888	.874
80	10.383	.778	8.988	.713	9.436	.767	8.888	.838	8.388	.372	9.837	.883	9.438	.828	9.888	.888	9.988	.788	8.738	.888	9.488	1.888	8.888	.873	8.988	.788	8.888	.281	8.881	.238	8.438	.488	8.788	.178	8.887	.138	8.383	.888	8.888	.888	8.847	.868
81	9.488	.885	8.484	.683	9.191	.915	8.381	.888	8.138	.383	10.879	1.888	9.221	.788	9.532	.783	9.888	.919	9.881	.989	9.873	1.279	13.888	1.888	8.883	.382	8.873	.788	8.888	.788	8.888	.479	8.188	.488	8.388	.888	8.382	.437	8.788	.388	8.883	1.887
82	9.883	.713	9.878	.743	9.784	.883	8.788	.883	8.868	1.842	9.382	.888	9.438	.888	9.388	.888	9.888	.888	8.888	.888	8.888	1.888	9.884	.881	8.788	.578	8.888	.788	8.333	.838	8.781	.883	7.888	.888	7.888	.883	8.278	.338	9.882	.728	8.848	.784
83	10.888	.731	9.888	.888	9.128	.872	8.882	.838	8.287	.888	9.888	.888	10.833	.778	9.883	.888	10.384	.788	8.888	.788	11.578	1.157	9.888	.888	8.888	.888	8.888	.847	8.888	.888	8.881	.388	7.888	.838	7.887	.138	8.388	.388	8.838	.888	8.788	.888
84	10.885	.788	8.887	.833	9.578	.988	9.888	.838	8.338	.827	9.778	.831	9.888	.884	9.887	.788	10.173	.788	9.157	.885	10.888	1.237	10.111	.899	9.138	.883	8.138	.838	8.883	.888	8.888	.838	7.883	.888	7.887	.888	8.883	.888	8.728	.888	8.781	.888
85	10.263	.788	9.885	.882	9.885	.735	8.853	.888	8.388	.388	9.872	.896	9.873	.885	8.873	.138	10.385	.811	8.867	.811	9.838	1.388	9.178	.888	8.988	.833	8.888	.388	8.883	.883	8.388	.838	8.887	.888	7.887	.883	8.883	.888	8.883	.888	8.884	.884
86	9.888	.882	8.817	.883	9.182	.888	9.888	.873	8.333	.887	9.887	.888	9.888	.788	9.882	.827	11.838	1.888	8.888	.888	8.888	.881	9.384	.728	8.888	.888	8.388	.888	8.883	.372	8.888	.888	8.888	.887	8.888	.887	8.883	.887	8.973	.838	8.888	.888
87	9.888	.738	8.788	.881	8.117	.738	8.888	.867	8.128	.882	10.788	1.288	9.887	.884	9.838	.738	10.888	1.888	8.888	.888	8.838	1.118	8.888	.888	8.118	.788	8.788	.872	8.882	.188	8.888	.888	8.888	.887	7.888	.888	8.883	.888	8.888	.773	8.888	.888
88	9.948	.784	8.783	.883	9.178	.782	8.437	.867	8.188	.884	10.838	1.118	9.863	.874	10.887	.728	10.883	1.888	8.888	.873	9.883	1.238	9.472	.883	9.817	.787	8.888	.883	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
89	9.574	.757	8.833	.728	9.111	.793	8.388	.875	8.838	.374	10.888	1.884	9.784	1.888	10.128	.782	9.888	1.887	8.781	.881	8.833	1.878	9.188	.817	9.882	.888	8.188	.887	8.888	.788	8.878	.888	8.888	.887	7.887	.888	8.888	.887	8.838	.883	8.887	.888
90	10.888	.788	8.871	.888	9.283	.793	9.131	.888	8.378	.888	10.887	1.884	9.572	.883	9.738	.887	10.883	.883	8.888	.878	9.888	1.887	9.481	.883	8.881	.888	8.888	.888	8.888	.878	8.884	.888	8.888	.888	7.888	.888	8.888	.888	9.133	.788	8.884	.788
91	10.225	.881	8.888	.887	9.287	.778	8.972	.888	8.388	.811	9.888	.888	9.888	.788	8.878	.838	10.387	.873	8.788	.388	8.887	1.888	8.888	.888	8.232	.888	8.128	.788	8.881	.888	8.838	.888	8.132	.144	8.888	.134	8.384	.838	8.788	1.871	8.887	.884
92	10.274	.788	8.958	.838	9.384	.888	8.388	.888	8.338	.882	10.888	.888	9.388	.888	9.888	.738	10.888	.838	8.888	.788	8.888	1.888	9.188	.888	8.888	.788	8.888	.888	8.888	.888	8.888	.888	8.888	.888	7.888	.888	8.888	.888	8.888	.888	8.888	.888
93	10.884	1.882	8.883	.718	9.883	.888	9.888	.888	8.388	.882	9.337	.838	9.388	.888	9.888	.717	10.887	.888	8.888	.888	9.138	1.888	8.787	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
94	10.144	.885	8.888	.838	9.278	.788	8.388	.838	8.388	.397	10.888	1.888	9.138	.888	9.888	.888	10.888	.867	8.788	.882	10.887	1.323	10.478	.878	9.838	.738	8.838	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
95	10.223	.731	8.781	.883	9.383	.738	8.788	.838	8.388	.378	10.881	.878	9.388	.878	10.881	.883	10.138	.888	8.813	.888	9.888	1.238	8.738	.883	8.888	.778	8.888	.883	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.738	8.838	.778
96	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
97	10.116	.797	8.737	.838	9.388	.888	8.881	.875	8.338	.888	10.855	1.838	9.784	.813	9.888	.715	10.887	.888	8.833	.888	9.888	1.884	9.831	.881	9.884	.888	8.888	.881	8.813	.888	8.878	.888	8.888	.888	8.888	.888	8.878	.888	8.888	.888	8.728	.838
98	10.888	.738	8.888	.841	9.888	.773	8.738	.888	8.838	.888	10.131	1.888	9.743	.867	10.883	.733	10.384	.878	8.788	.888	9.838	1.888	9.881	.738	9.321	.788	8.184	.888	8.328	.378	8.817	.838	8.188	.787	7.883	.838	8.888	.888	9.388	.888	8.773	.888
99	9.888	.881	9.888	.738	9.278	.888	8.743	.888	8.438	.888	9.738	.888	9.388	.838	9.838	.888	11.888	1.888	8.888	.888	8.888	1.888	9.888	.738	8.888	.813	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
100	9.888	.956	8.748	.574	9.388	.788	9.133	.888	8.388	.888	9.838	.888	9.838	.888	9.838	.888	11.787	1.888	8.888	.888	8.888	1.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
101	10.256	.788	8.838	.888	9.332	.788	8.778	.888	8.338	.888	10.882	.888	9.838	.888	9.838	.888	10.841	1.888	8.888	.888	8.888	1.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
102	10.888	.888	8.888	.888	9.888	.888	8.888	.888	8.888	.888	10.888	1.888	9.888	.888	9.888	.888	10.888	.888	8.888	.888	8.888	1.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888
103	9.843	.787	9.881	.787	9.388	.888	8.883	.817	8.888	.888	10.881	1.128	9.888	.888	9.888	.888	9.888	.888	8.888	.888	9.888	1.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888	8.888	.888

[a] A constant of nine has been added to each item score to avoid the awkward interpretation of negative attribute-environment correlations.

[b] Attribute Number 96, "Guest Values," was deleted because of low reliability.

APPENDIX F

CORRELATIONS BETWEEN CLUSTER CENTROIDS DERIVED FROM TWO SUBSAMPLES AND CLUSTER CENTROIDS DERIVED FROM THE TOTAL SAMPLE

Table 23. Pearson Correlations Between the Average Factor-Score Profiles of the 23 Macro Clusters Derived from Subsample A and the Average Factor-Score Profiles of the 21 Macro Clusters Derived from the Total Sample

Table 24. Pearson Correlations Between the Average Factor-Score Profiles of the 23 Macro Clusters Derived from Subsample B and the Average Factor-Score Profiles of the 21 Macro Clusters Derived from the Total Sample

Table 23

Pearson Correlations Between the Average Factor-Score Profiles of the 23 Macro Clusters Derived from Subsample A and the Average Factor-Score Profiles of the 21 Macro Clusters Derived from the Total Sample[a]

Total Sample Clusters	Subsample A Clusters											
	1	2	3	4	5	6	7	8	9	10	11	12
1	.992*	.799	.784	.666	.800	.781	.662	.683	.563	.730	.472	.595
2	.845	.759	.990*	.830	.642	.657	.746	.496	.577	.550	.422	.533
3	.875	.993*	.739	.736	.612	.589	.555	.668	.651	.627	.414	.547
4	.712	.717	.629	.580	.468	.453	.460	.447	.858*	.658	.375	.664
5	.603	.640	.738	.941*	.585	.505	.741	.457	.485	.451	.401	.420
6	.746	.577	.643	.598	.970*	.730	.866*	.615	.328	.563	.403	.521
7	.643	.515	.624	.497	.670	.563	.656	.346	.479	.438	.342	.898*
8	.711	.570	.540	.557	.649	.843*	.567	.439	.394	.521	.340	.501
9	.707	.569	.471	.461	.523	.467	.488	.487	.562	.988*	.324	.407
10	.553	.847	.463	.585	.333	.285	.334	.490	.559	.461	.322	.391
11	.609	.520	.501	.422	.399	.411	.394	.447	.426	.403	.830*	.378
12	.363	.418	.265	.317	.533	.360	.388	.903*	.180	.297	.279	.201
13	.364	.363	.298	.379	.221	.341	.302	.175	.541	.563	.188	.282
14	.096	.165	.178	.318	.352	.087	.326	.259	.114	.131	.246	.159
15	.174	.179	.201	.306	.491	.200	.402	.330	.032	.191	.268	.196
16	.254	.234	.285	.366	.625	.272	.505	.239	.086	.237	.328	.296
17	.121	.196	.267	.402	.258	.074	.435	.083	.192	.130	.237	.194
18	.224	.332	.324	.575	.269	.180	.417	.246	.258	.242	.320	.261
19	.200	.282	.266	.356	.283	.198	.320	.114	.244	.198	.348	.305
20	.220	.186	.217	.279	.561	.239	.426	.244	.078	.190	.207	.259
21	.274	.368	.269	.496	.226	.146	.395	.195	.241	.319	.182	.214

[a]Asterisks identify a priori matched clusters from the two analyses. In two cases, two clusters from Subsample A were matched with one cluster from the total sample.

Table 23 (continued)

Total Sample Clusters	Subsample A Clusters (continued)										
	13	14	15	16	17	18	19	20	21	22	23
1	.516	.415	.094	.128	.046	.309	.159	.238	.348	-.094	.080
2	.440	.404	.296	.298	.171	.400	.204	.290	.453	.066	.197
3	.796	.361	.177	.260	.099	.337	.163	.222	.444	.002	.157
4	.663	.332	.318	.394	.229	.400	.205	.235	.387	.222	.239
5	.479	.481	.613	.652	.464	.679	.453	.538	.607	.319	.353
6	.338	.728	.284	.192	.303	.492	.399	.583	.401	.030	.119
7	.305	.565	.299	.201	.189	.355	.207	.422	.320	.213	.070
8	.379	.330	.147	.151	.070	.323	.195	.301	.326	.222	.237
9	.520	.284	.116	.200	.092	.277	.152	.164	.394	-.054	.361
10	.958*	.247	.334	.479	.205	.366	.229	.255	.495	.217	.229
11	.292	.178	.075	.119	.022	.186	.048	.069	.173	-.063	-.043
12	.318	.325	.144	.190	.324	.453	.474	.343	.184	-.030	-.016
13	.400	.090	.191	.356	.104	.251	.121	.117	.416	.237	.897*
14	.270	.500	.637	.629	.954*	.918*	.862	.709	.327	.443	.160
15	.245	.510	.504	.473	.766	.755	.965*	.802	.311	.314	.134
16	.263	.663	.722	.474	.629	.740	.675	.975*	.385	.569	.154
17	.328	.323	.994*	.773	.620	.698	.547	.629	.583	.579	.240
18	.509	.308	.722	.974*	.633	.721	.590	.515	.591	.483	.385
19	.387	.314	.661	.604	.481	.576	.455	.571	.334	.900*	.264
20	.146	.930*	.334	.300	.735	.595	.554	.609	.205	.175	.041
21	.540	.172	.562	.672	.276	.417	.300	.315	.932*	.222	.381

[a]Asterisks identify a priori matched clusters from the two analyses. In two cases, two clusters from Subsample A were matched with one cluster from the total sample.

Table 24

Pearson Correlations Between the Average Factor-Score Profiles of the 23 Macro Clusters Derived from Subsample B and the Average Factor-Score Profiles of the 21 Macro Clusters Derived from the Total Sample[a]

Total Sample Clusters	Subsample B Clusters											
	1	2	3	4	5	6	7	8	9	10	11	12
1	.831	.693	.899*	.984*	.745	.793	.794	.497	.693	.603	.457	.440
2	.990*	.927	.825	.805	.612	.706	.703	.686	.504	.532	.434	.314
3	.795	.694	.698	.887	.655	.990*	.616	.477	.619	.540	.429	.441
4	.659	.629	.529	.730	.481	.696	.486	.670	.646	.459	.433	.283
5	.737	.904*	.631	.562	.462	.615	.652	.592	.416	.358	.438	.402
6	.673	.654	.882	.706	.576	.555	.993*	.541	.485	.367	.375	.514
7	.643	.556	.687	.612	.495	.488	.674	.892*	.351	.372	.324	.234
8	.594	.560	.731	.694	.921*	.577	.643	.375	.430	.339	.512	.320
9	.521	.464	.579	.699	.456	.573	.570	.304	.988*	.381	.593	.301
10	.508	.467	.353	.574	.381	.864	.336	.333	.494	.281	.336	.362
11	.529	.482	.511	.605	.412	.496	.416	.362	.391	.985*	.204	.279
12	.275	.290	.393	.359	.282	.448	.495	.146	.312	.228	.114	.949*
13	.326	.368	.325	.345	.333	.376	.281	.194	.486	.122	.961*	.121
14	.164	.324	.156	.069	.046	.160	.353	.229	.131	-.009	.139	.418
15	.195	.308	.285	.143	.146	.179	.473	.187	.175	-.022	.152	.560
16	.275	.394	.379	.226	.179	.234	.613	.363	.176	.023	.215	.394
17	.242	.429	.166	.087	.038	.179	.319	.391	.137	.029	.210	.228
18	.310	.502	.239	.194	.163	.332	.312	.331	.282	.108	.317	.322
19	.250	.363	.238	.181	.234	.284	.285	.424	.176	.050	.320	.222
20	.221	.302	.345	.185	.144	.168	.539	.330	.130	.038	.101	.302
21	.278	.397	.215	.250	.164	.395	.298	.244	.349	.073	.410	.222

[a]Asterisks identify a priori matched clusters from the two analyses. In two cases, two clusters from Subsample B were matched with one cluster from the total sample.

Table 24 (continued)

Total Sample Clusters	Subsample B Clusters (continued)										
	13	14	15	16	17	18	19	20	21	22	23
1	.067	.167	.262	.313	.148	.101	.302	.413	.209	.254	.264
2	.161	.223	.303	.422	.352	.206	.331	.400	.248	.289	.365
3	.109	.168	.226	.387	.230	.233	.382	.537	.162	.388	.598
4	.208	.190	.249	.437	.346	.329	.529	.851*	.188	.288	.558
5	.470	.476	.538	.748	.664	.563	.487	.386	.431	.522	.425
6	.325	.453	.598	.377	.334	.133	.318	.256	.581	.269	.175
7	.186	.220	.461	.340	.345	.122	.481	.598	.373	.203	.265
8	.106	.222	.334	.323	.204	.138	.381	.316	.181	.257	.170
9	.088	.151	.182	.311	.150	.188	.261	.475	.148	.325	.275
10	.213	.202	.258	.485	.373	.483	.521	.639	.131	.535	.818*
11	.018	.043	.078	.208	.103	.072	.204	.309	.032	.092	.220
12	.369	.500	.326	.312	.148	.171	.208	.148	.272	.182	.185
13	.103	.112	.136	.360	.229	.306	.307	.333	.037	.336	.265
14	.989*	.834	.661	.672	.624	.564	.488	.305	.644	.279	.312
15	.797	.983*	.737	.602	.486	.426	.409	.224	.583	.279	.191
16	.672	.692	.993*	.578	.736	.398	.599	.337	.656	.342	.258
17	.618	.509	.659	.706	.982*	.639	.598	.383	.377	.547	.395
18	.626	.547	.511	.935*	.745	.935*	.572	.410	.363	.588	.449
19	.497	.411	.620	.636	.680	.526	.955*	.619	.297	.323	.445
20	.670	.585	.589	.416	.338	.240	.261	.188	.967*	.132	.160
21	.281	.288	.333	.608	.604	.668	.366	.306	.166	.990*	.353

[a]Asterisks identify *a priori* matched clusters from the two analyses. In two cases, two clusters from Subsample B were matched with one cluster from the total sample.

APPENDIX G

RESULTS OF THE DISCRIMINABILITY ANALYSES

Table 25. Kruskal-Wallis H Statistic Between 21 Macro Clusters on Each of the 102 OAI Work Dimensions (Factors)

Table 26. Inter-Correlation Matrix of the Average Factor-Score Profiles for the 21 Macro Clusters Derived from the Total Sample of Jobs

Table 25

Kruskal-Wallis H Statistic Between 21 Macro Clusters on Each of the 102 OAI Work Dimensions (Factors)[a,b]

Factor Number	H Statistic	Factor Number	H Statistic	Factor Number	H Statistic
1	310.8*	35	233.8*	69	173.6*
2	787.2*	36	245.0*	70	362.2*
3	455.0*	37	288.0*	71	510.8*
4	326.6*	38	214.0*	72	777.4*
5	271.2*	39	326.8*	73	823.8*
6	474.2*	40	90.8*	74	786.8*
7	427.2*	41	501.6*	75	482.6*
8	565.8*	42	205.6*	76	519.2*
9	693.8*	43	82.4*	77	392.2*
10	280.4*	44	318.4*	78	701.0*
11	519.6*	45	73.4*	79	349.2*
12	596.8*	46	534.6*	80	417.2*
13	371.0*	47	66.2*	81	379.6*
14	613.0*	48	340.6*	82	548.0*
15	489.6*	49	307.0*	83	635.4*
16	280.2*	50	532.6*	84	221.0*
17	653.4*	51	273.6*	85	114.4*
18	270.8*	52	75.6*	86	769.2*
19	370.4*	53	518.4*	87	301.4*
20	614.4*	54	350.6*	88	469.2*
21	701.6*	55	419.2*	89	439.8*
22	334.8*	56	535.2*	90	522.2*
23	713.0*	57	378.0*	91	290.2*
24	622.2*	58	330.6*	92	513.8*
25	375.0*	59	108.2*	93	666.6*
26	479.2*	60	190.4*	94	303.0*
27	639.8*	61	265.2*	95	646.2*
28	301.6*	62	280.8*	96	345.6*
29	596.4*	63	175.0*	97	505.0*
30	418.8*	64	904.0*	98	519.2*
31	333.8*	65	834.4*	99	512.0*
32	470.8*	66	446.2*	100	522.0*
33	538.6*	67	93.4*	101	306.6*
34	321.6*	68	138.2*	102	447.8*

[a]For a list of the factor titles, see Table 2.

[b]For a description of the procedure used, see Appendix B in Winer (1971).

*Using chi-square distribution (df=20), significant at or less than .01 level.

Table 26

Inter-Correlation Matrix of the Average Factor-Score Profiles for the 21 Macro Clusters Derived from the Total Sample of Jobs

Cluster Number	Cluster Number 1	2	3	4	5	6	7	8	9	10	11
1 (n = 195)	1.000	.823	.848	.681	.595	.778	.635	.729	.701	.514	.603
2 (n = 155)		1.000	.775	.673	.790	.694	.653	.595	.527	.494	.533
3 (n = 171)			1.000	.739	.651	.613	.547	.620	.614	.833	.538
4 (n = 13)				1.000	.594	.466	.664	.488	.635	.663	.463
5 (n = 62)					1.000	.644	.528	.533	.439	.551	.388
6 (n = 90)						1.000	.673	.618	.531	.335	.396
7 (n = 12)							1.000	.534	.384	.363	.385
8 (n = 20)								1.000	.465	.388	.358
9 (n = 44)									1.000	.470	.388
10 (n = 31)										1.000	.307
11 (n = 4)											1.000
12 (n = 14)											
13 (n = 16)											
14 (n = 70)											
15 (n = 30)											
16 (n = 112)											
17 (n = 98)											
18 (n = 66)											
19 (n = 27)											
20 (n = 22)											
21 (n = 33)											

Table 26 (continued)

Cluster Number	Cluster Number (continued)									
	12	13	14	15	16	17	18	19	20	21
1 (n = 195)	.408	.354	.107	.198	.278	.111	.223	.194	.239	.253
2 (n = 155)	.295	.340	.219	.242	.331	.308	.371	.302	.260	.312
3 (n = 171)	.420	.389	.163	.188	.253	.194	.336	.294	.193	.384
4 (n = 13)	.264	.417	.261	.205	.287	.329	.423	.458	.203	.331
5 (n = 62)	.359	.388	.539	.483	.583	.632	.737	.524	.419	.550
6 (n = 90)	.518	.247	.353	.483	.601	.294	.299	.261	.566	.273
7 (n = 12)	.210	.230	.205	.251	.475	.298	.264	.427	.373	.228
8 (n = 20)	.258	.448	.141	.245	.349	.152	.245	.386	.190	.258
9 (n = 44)	.301	.522	.122	.180	.200	.133	.261	.170	.170	.337
10 (n = 31)	.346	.371	.263	.227	.284	.348	.507	.454	.139	.542
11 (n = 4)	.253	.145	.054	.050	.101	.083	.167	.127	.082	.104
12 (n = 14)	1.000	.083	.413	.509	.319	.160	.283	.140	.302	.172
13 (n = 16)		1.000	.140	.121	.155	.206	.364	.328	.047	.384
14 (n = 70)			1.000	.818	.678	.661	.680	.526	.638	.334
15 (n = 30)				1.000	.730	.521	.560	.430	.576	.310
16 (n = 112)					1.000	.706	.544	.636	.590	.368
17 (n = 98)						1.000	.755	.643	.356	.593
18 (n = 66)							1.000	.627	.368	.654
19 (n = 27)								1.000	.281	.385
20 (n = 22)									1.000	.157
21 (n = 33)										1.000

APPENDIX H

THE JOBS CONTAINED IN THE IDENTIFIED MICRO CLUSTERS

Table 27. The 88 Micro Clusters Arranged Under Their Respective Macro Cluster Titles and Categories

Table 27

The 88 Micro Clusters Arranged Under Their Respective
Macro Cluster Titles and Categories

Macro Cluster 1: Organizational and Human Relations Occupations

High-Level Administrators and Managers

Cluster 1

General Manager	187.168
Vice President, Purchasing	189.118
Administrator, Scheduling	169.268
Manager, Loss Prevention	184.168
Contract Clerk Supervisor	239.138
Manager, City Circulation	163.118
Regional Claims Manager	186.118
Dockmaster	187.118
Stewardess Service Manager	352.118
Director, General Aviation	184.168
Manager, Food Checkers and Cashiers	319.168
Credit Manager	186.138
Policy Issue Supervisor	169.138
Secretary of Insurance Company	189.118
Station Manager	184.118
Systems Manager	189.118
Manager, Advertising	164.118
Vending Enterprises Supervisor	185.168
Supervisor of Employment	166.168
Manager, Retail Food Store	185.168
Supervisor, Mail Order	231.138
Department Head-Buyer	229.138
Proprietor-Manager, Retail Automotive Service	185.168
Manager, Theater	187.168
Purchasing Agent	162.158
Savings Operations Officer	212.138
Manager, Sales	163.11[illegible]
Motel Manager	320.137
Credit Supervisor	240.138
Operations Officer	186.168
Controller	186.118
Manager, Office	169.137
Securities Trader	186.168
Auditor	160.188
Senior Accounting Clerk	160.138

NOTE: The footnotes for this table appear on p. 207.

Table 27 (continued)

Supervisor, Payroll	219.138
Head Catalog Librarian	100.168
Personnel Manager	166.118
Administrative Assistant	169.168
Assistant Secretary and Manager of C.O.P.	012.188
Director, University Extension	090.118
Telephone Operator, Chief	235.138
Market-Research Analyst I	050.088
Underwriter	169.188
Superintendent, Airport	184.118
Recreation Supervisor	187.118
Social Welfare Administrator	195.118
Executive Vice President of Chamber of Commerce	187.118
Manager, Area Development	184.118
Corporation President	189.118
Branch Bank Manager	186.168
Assistant Branch Bank Manager	186.138
Manager, Credit	168.168
Manager, Premium and Commission Accounting	160.168
Principal	091.118
Transfer Agency and Registrarship Administration	186.118
Data Processing Director	229.118
Supervisor, Communication Center	203.138

Mid- and Lower-Level Administrators and Managers

Cluster 2

Executive Housekeeper	187.168
Beauty Salon Manager	187.118
Supervisor, Stock	223.138
Route Supervisor	292.138
Unload and Sort Supervisor	222.138
Manager, Airline Lounge	187.138
Hospitality House Supervisor	349.168
Steward, Hotel	310.138
Embalmer	338.381
Buyer, Grain	162.168

Cluster 3

Customer Service Supervisor	241.138
Evaluation Supervisor	219.138
Avionics Foreman	184.168
General Plant Manager	184.168

Table 27 (continued)

Cluster 4	
Chief Inspector	184.168
Traffic and Credit Manager	184.168
Cluster 5	
Personnel Clerk	205.368
Employment Clerk	205.368
Placement Officer	166.268
Employment Interviewer	205.368
Personnel Representative	166.168
[b]Floor Representative	162.158
[b]Security Officer, Vessel	372.368
[b]Telephone Operator	235.782
Eligibility Worker	249.168
[b]Chief Dispatcher	372.168
[b]Salesman, Beef	262.358
Cluster 6	
Legislative Liaison	165.068
Unemployment Insurance Hearing Officer II	110.107
Telephone Credit Man	240.368
Reservations Manager	187.118
[a]Director, Advertising	164.118
Claims Adjuster	241.168
Cluster 7	
Coordinator, Personnel Services	166.168
Credit and Collection Manager	168.168
Mailing Foreman	239.138
Meter Reader, Chief	239.138
Supervisor	235.132
Cluster 8	
Foreman, Plate Manufacturing	502.130
Manager, Soap and Synthetics and Glycerin	558.885
Manager, Warehouse	184.168
Foreman, Record Press	559.132
Foreman	590.132
Assembly Foreman	710.131
Foreman, Refill Assembly	733.137

Table 27 (continued)

Food Service Director	077.118
Department Head, College or University	090.168
Chief Pilot	196.168
Paste Plant Shift Foreman	549.132
Shift Foreman, Specialty Manufacturing	616.130
Cluster 9	
Manager, Front Office	187.168
Service Manager	299.138
Cardroom Manager	343.138
Senior Collector	240.138
Customer Service Supervisor	259.138
Supervisor of Stewardess Services	352.138
Sales Floor Superintendent	299.137
Parking Lot Supervisor	349.168
Farm Youth Day-Haul Supervisor[b]	405.137
Cooked Foods Supervisor	319.134
Cluster 10	
Production Manager, Advertising	164.138
Executive Art Director	169.118
Director, Museum of Art	102.118
Display Manager	142.031
Art Coordinator	102.061
Fashion Show Coordinator	297.138
Manager-Salesman	259.118
Manager, Main Store	299.138
Manager, Shoe Repair	187.118
Recreation Facilities Designer	199.118
Educators, Advisors, and Counselors	
Cluster 11	
Superintendent, Schools	091.118
Corporation Lawyer	110.118
Clergyman	120.108
Psychologist	045.088
Sociologist	054.088
Faculty Member, College or University	090.228
Instructor, Bridge	159.228
Teacher, Elementary School	092.228
Teacher, Secondary School	091.228

Table 27 (continued)

Language Teacher	099.228
Music Teacher	152.028
Director, Religious Education	129.108
Social Director	045.108
Case Worker	195.108
Employment Service Counselor II	045.107
Apprenticeship Training Representative	188.118
[b] Consumer Information Agent	096.128
[b] Utilities Service Inspector	376.868

Research and Data Processing/Analysis Specialists and Managers

Cluster 12

Systems Analyst, Business-Electronic-Data Processing	012.168
Programmer, Business	020.188
Mathematician	020.088
Job Analyst	166.088
Biologist	041.081
Seismologist	024.081
Material Requirements Man A and B	223.388
Civil Engineering Associate	018.188
Production Clerk, Paperboard Products	221.168
Estimator	160.288
Production Change Analyst	012.168
Production Control Clerk	221.168
Material Scheduler	012.188
Treasurer	161.118
Portfolio Investment Analyst	020.188
Technical Reporting Analyst	139.168
Research Analyst	050.087
[b] Assistant Ranger	040.288
Policy Technician	119.288
Educational Data Processing Technician	099.128
Analytical Engineer	020.088
Director, Sales Education	166.228
Instructor, Programming Technology	097.228
Mark-Up Man	249.388
Library Assistant	249.368
Programmer, Detail	219.388
Surveyor	018.188
Surveyor	249.268
Engineering Technician 6-10	040.031
Chemical Engineer	008.081
Director, Air and Water Control	168.118
Waterworks Engineer	005.081

Table 27 (continued)

Microbiologist	040.081
Physicist	023.081
Environmental Engineer VI	005.138
Steam-Plant Economy Control Supervisor	184.168
Inventory Coding Supervisor	449.388
Hydrologist	024.081
Water Bacteriologist	041.281
Aquaculturist	041.031

Writers

Cluster 13

Editor, Sports	132.038
City Sports Writer	143.068
Author	130.088
Columnist	132.068
[a]Curator, Natural History Museum	102.168
Publication Engineer	139.228
Script Writer	131.088

Miscellaneous Organizational and Human Relations Occupations

Cluster 14

Policyholder's Information Clerk	204.268
[b]Job Printer	973.381

Macro Cluster 2: Clerical Occupations

Computing and Account Recording Occupations

Cluster 15

Billing Clerk	219.388
Accounting Clerk B	219.488
Accounting Machine Operator	219.588
Production Clerk II	221.388
Audit Clerk	210.388
Bookkeeper I	210.388
Accountant	210.388
Accounting Clerk	219.488

Table 27 (continued)

Packing Clerk	221.388
Bookkeeping-Machine Operator I	210.388
Cashier I	211.468
Invoice Control Clerk	219.488
Clerk	211.468
Payroll Clerk	213.582
Clerk Typist	219.388
Calculating-Machine Operator	216.488
Biller, Mail Order	219.388
Shipping Clerk	222.368
Checker II	209.688
General Office Clerk	219.388
Billing Clerk I, Source Document Verifier	219.488
Policy Issue Clerk	209.388
Labor Analysis Clerk	219.488
Monthly Reports Clerk	219.386
Product Development Secretary	229.388
Teletype Operator	203.588
Clerk Aide	237.368
Insurance Clerk	210.368
Fuel-Oil Clerk	210.388
Loan Officer	186.288
Monthly Report Clerk	219.488
Traffic Clerk	222.588
Secretary	219.388
Label Processor	222.388
Correspondence Service Clerk	204.388
Tallyman, Loading	229.368
Ticketer	229.588
Telephone Order Dispatcher	209.588
File Clerk II	206.388
[b] Industrial Engineering Technician	012.288
Piping Materials Control Clerk	223.368

Table 27 (continued)

[b]Time Study Analyst I	012.288
Assistant Cashier	211.468
Order Processor	229.368
Cashier-Wrapper	211.468
Log Scaler	941.488
Licensing Clerk	205.388
Senior Clerk	219.388
Material Usage Auditor	210.388

Occupations Concerning Credit and Cash Handling Operations

Cluster 16

Credit Limit Follower	191.268
Credit Clerk	249.368
Log Sales Coordinator	299.118
Credit Manager	249.268
Foreign Trade Services	204.388
Receptionist Bookkeeper	219.388
Head Throw-Out Desk Clerk	240.388
Reservations Clerk	242.368
Receptionist-Secretary	205.368
Collection Clerk	219.368
General Office Clerk	219.468
Teller	212.368
Night Auditor	210.388
Chief Cashier	211.138
Credit Man	168.268
Airport Clerk	219.388
Bookkeeper I	210.388
Transit Clerk	217.388
Lost Card Clerk	249.368
Checker I	209.688
Time Keeper, Chief	219.138
Order Clerk II	249.368
Head Teller	212.138
Wires Transfer Clerk	203.588
Financial Records Examiner III	160.187
Assistant Cashier, Bookkeeping	186.168
Remittance Supervisor	249.138
Racing Secretary and Handicapper	153.168
Operations Assistant	186.168
Cash Shortage Investigator	376.268

Table 27 (continued)

Secretarial Occupations

Cluster 17

Secretary	201.368
Secretary-Assistant to Personnel Services Coordinator	205.268
Secretary	219.388
Clerk	221.388
Receptionist, Plywood Company	235.862
Correspondence Clerk	204.288
Stenographer and Inventory Clerk	202.388
Office Girl	209.368
[b]Secretary I, Personnel	201.368
[b]Assistant Manager	201.138
Medical Secretary	201.368
Stenographer	202.388
Transcribing-Machine Operator	208.588

Keyboard Office Machine Operators

Cluster 18

Encoder	209.588
Key Punch Operator	213.582
Billing-Control Clerk	210.388
Card-Type Machine Operator A	213.382
Typist	203.588
Senior Composer-Operator	203.382
[b]Hearings Reporter	202.387
[b]Tooling Specialist	007.187
Terminal Operator	213.582
Proof-Machine Operator	217.388
Clerk-Typist; Compositer	207.382
*Billing Machine Operator	214.488

Electronic Data Processing Equipment Operators

Cluster 19

Digital Computer Operator	213.382
[b]Mill Recorder, Computerized Mill	213.382
[b]Data Processing Manager	169.168
Supervisor and Lead Computer Operator	213.132

*This job was combined with the jobs in the above cluster only after that cluster combined with other clerical jobs.

Table 27 (continued)

Material/Production Recording Clerks	
Cluster 20	
Assistant Foreman, Prize and Chest	221.133
Test Inspector	221.688
Car Checker	209.588
Wheel Press Clerk	229.588
Production Operator	221.587
Engineering Master Layout Control Man	206.388
Pole Inspector	229.687
Stem Checker and Recorder	224.487
Weigher II	224.487
Receiver, Gate	222.488
Weight Checker	224.587
Authorizer, Regular Accounts	249.388
Assistant Dispatcher	219.588
Power Load Records Clerk	219.488
Meter Book Assembly and Billing Clerk	219.588
Potline Monitor	249.487
Log Scaler	941.488
Platform Foreman	299.138
Scaleman	224.487
[b]Cook, Kettle	526.782
Classifier	361.687
File Clerks and Related Occupations	
Cluster 21	
Ward Clerk	219.388
Advertising Clerk	209.388
Classification Clerk	206.388
Perforator Operator	208.588
Coding Clerk	219.388
Tool Order Control Clerk	221.388
Runner	230.587
[b]Teacher, Speech	091.228
Floor Reporter	239.588
Jig and Tool Storage Man	223.387
Miscellaneous Clerical Occupations	
Cluster 22	
Accounting Supervisor	217.138
Accounting Clerk A	219.488
Agency Appointments Supervisor	209.138
Medical Records Librarian	100.168

Table 27 (continued)

Cluster 23	
Mail Desk Clerk	219.388
Service Clerk	243.368
Student Assistant	219.488
Hospital-Admitting Clerk	237.368
Supervisor of Correspondence Section	204.138
[b]Electroencephalograph Technician	078.368
Cluster 24	
[b]Unemployment Insurance Claims Administrator	169.268
[b]News Director	131.038
[b]Claims Manager	189.118
Night Building Superintendent	381.137
Supervisor, Telephone Information	237.138
Unit Supervisor	216.368

Macro Cluster 3: Sales and Customer Service Occupations

Salespersons and Agents, Services

Cluster 25	
Traffic Agent	255.258
Salesman, Public Utilities	257.358
Order Clerk, Food and Beverages	319.468
Ticket Agent	919.368
Production Superintendent	180.118
Salesman, Trading Stamps	252.358
Insurance Salesman	250.258
[a]Salesman, Ready-Mix Concrete	276.358
Field Representative	252.258
Retail Advertising Salesman	258.358
Tour Agent	255.358
Salesman, Real Estate	250.358
Telephone Order Taker	299.368
Travelers Cheque Representative	252.258
Merchant Sales Representative	252.258
Comparison Shopper	296.388
Group and Convention Sales Representative	255.358
Assistant Sales Manager	289.158
Manager, Promotion	163.118
Hotel Clerk	242.368
Airplane Stewardess	352.878
Hotel Clerk	242.368
Assistant Reservations Manager	242.368
[a]Usher	344.878
Public Service Director	184.168
Representative, Personal Service	257.258

Table 27 (continued)

Superintendent, Service	329.138
Coffee Shop Hostess	219.468
Manager, Restaurant or Coffee Shop	187.168
[b] Librarian	100.168
Chief Steward	350.138
Conductor, Passenger Car	198.168
[b] Training Operator	235.322
Information Desk Clerk	237.368
Delivery Information Counter Supervisor	249.138
Assistant Registrar	205.368
Golf Course Starter	341.368
Administrative Assistant	372.168
[b] Fraud Investigator	376.268
Assistant Manager, Refuse Collection	184.168
Communications Consultant	257.258
[b] Forester	162.118
Estimator, Carpeting	299.388
Cluster 26	
Guide Establishment	353.368
Receptionist, Airline Lounge	352.868
[b] Music Director	159.048
Director, Recreation	352.168
Wine Steward	310.137
Hostess, Restaurant or Coffee Shop	310.868
Manager, Catering	187.168
Airport Tour Guide	353.368
Housemother	359.868
Salespersons, Commodities	
Cluster 27	
Sales Representative	280.158
Salesman, Communication Equipment	278.258
Salesman, Building and Construction, Equipment and Supplies	276.358
Salesman, Construction Machinery	276.358
Salesman	285.358
Cluster 28	
Salesman, Storage	259.258
Salesman, Business Forms	265.358
Sales Representative	254.258
Company, Representative, Wallcovering	265.358
Salesman, Furniture	274.358
Wedding Gift Consultant	299.358
Assistant Store Manager	283.358

Table 27 (continued)

Silver Saleslady	283.458
Salesperson, Sporting Goods	286.358
Home Service Representative	278.258
Manager, Building Supplies	185.158
Department Manager-Men's Clothing	299.138
Head Bakery Sales Clerk	290.478
Manager, Store	185.168
Department Manager-Women's Shop	299.138
Salesperson-Men's Clothing	263.458
Salesperson-Women's Shop	263.358
Manager, Music Store	287.358
Manager, Piano Store	287.358
Showroom Manager	185.158
Field Salesman, Floor Tile	274.358
Salesman, Leather Goods	264.358
Salesman-Driver, Diapers	292.358
Customer Service Representative	299.258
Bakery-Wagon Driver	292.358
Salesman, Food Products	262.358
Lunch Truck Driver	292.468
Salesperson, Men's Furnishings	263.358
Salesperson, Book	289.358
Salesperson, General	289.458
Salesman, Floor Coverings	274.358
Salesperson, Men's and Boy's Clothing	263.458
Newspaper Carrier	291.868
Assistant Circulation Manager	289.358
Salesman, Soft-Water Service	259.358
[a]Salesman, Financial Service	252.258

Sales Clerks and Counterpersons

Cluster 29

Ticket Seller	211.468
Salesman, Batteries	278.358
Press Box Custodian	344.878
[a]Director of Group Sales	293.358
Cashier	211.468
Clerk, Formal Wear	299.358
Customer Service Clerk	241.368
Platform Man, Ice	299.867
Car Hop	311.878
Check Room Chief	358.137
Salesclerk, Health Foods	290.478
Head of Stock	299.358
Custom Gift-Wrapper	299.464
Salesperson-Shoes	263.358
Combination Girl	314.878
Fountain Girl	219.878

Table 27 (continued)

Groceryman, Journeyman	290.468
Food Checker	216.488
Food Tabulator, Cafeteria	216.588
Vendor	291.858
Curb Boy	369.478
Cluster 30	
Waitress	311.878
Dispatcher, Motor Vehicle	919.168
Dockmaster	911.873
Salesperson, Automotive Parts	289.358
Sales Clerk	290.478
Grocery Checker	299.458
Bar Boy	312.887
Bartender	312.878
Baggageman	358.878
Automat-Car Attendant	319.864
Dock Attendant	329.874
Automobile Service Station Attendant	915.867
Countergirl	317.878
[b] Teacher, Nursery School	359.878
[b] Manicurist	331.878
[b] Egg Room Supervisor	412.864
Miscellaneous Merchandising Occupations	
Cluster 31	
Senior Program Merchandiser	253.158
Manager, Mobile Home Park	320.168
Owner-Salesperson, Stamps	289.358
Liquidation Broker	162.158
Cluster 32	
Clerk, Costumes	299.454
Fitter, Wigs	332.271
Cluster 33	
Salesman-Sporting Goods	286.358
Dockmaster	299.358
Salesman, Advertising	258.358
Cluster 34	
Weighing-Station Operator	224.487
[b] Tractor-Trailer Truck Driver	904.883
Routeman, Retail Dairy Products	292.358

Table 27 (continued)

Salesman, Paper and Paper Products	265.358
Manager, Utility Sales and Service	163.168
Salesman, Radio and Television Time	253.358
Exterminator	389.884
Cluster 35	
Gemologist	199.281
[b]Manager, Design and Cost	189.118
Cluster 36	
[b]Dietitian	077.168
Manager, Cafeteria or Lunchroom	187.168
Cook-Manager	313.131
Purchasing Steward	162.158
Salesperson, Pets	289.358
[b]Hatchery Manager	412.137

Macro Cluster 4: Protective Service Occupations[c]

Macro Cluster 5: Material/Product Handling, Inspecting, and Recording Occupations

Material/Product Handling and Recording Occupations

Cluster 37	
Order Filler	922.887
Stock Clerk	223.367
Parking Center Package Desk Attendant	299.478
Colorman, Racing	346.687
Stock Clerk Helper	223.887
Tool Crib Attendant	223.387
Receiving Clerk	222.387
Shipping Clerk II	222.587
Parcel Post Clerk	231.388
Stock Room Attendant	223.387
Utility Hand	223.687
Production Operator	221.487
Bulk Marker	209.588
Apron Writer; Receiving Clerk	222.587
Stock Clerk	223.387
Production Operator	221.388
Killman	206.587
Linen Room Worker	223.387
Rotex Man	224.487
Bin Assorter	223.887

Table 27 (continued)

Time Checker	219.488
Ready-to-Wear Hanger	299.887
Laborer, Stores	922.887
Material Handler	929.887
Folder-Wrapper	369.887
Stock Clerk	223.687
Book-and-Game-Line Attendant	920.887
Tallyman	223.588
Store Room Clerk	223.387
Order Man, Set Packing	221.388
Weigher and Recorder	224.487
Stock Clerk	223.387
Container Control Clerk	223.387

Material/Product Inspecting and Testing Occupations

Cluster 38

Cooling-Tank Tester	827.384
Mounter, Automatic	976.885
Autoclave Operator	553.782
Glueman	762.884
Slitter, Processed Film	976.884
Threader	685.780
Inspector	789.687
Sock Knitter	684.885
Seamer	787.782
Checker and Tester	729.387
Inspector-Shipping General	222.387
Water Tester	703.687
Coil Finisher	724.887
[a]Patternmaker	781.381
[b]Certified Orthotist and Prosthetist	078.261
Casting Inspector	514.687
Stocking Inspector	684.684
Sample Girl	789.887
Veneer Clipper	663.885
Capacitor Winder	726.884
Quality Control Projectionist	960.382
Inspector, Continuous-Weld-Pipe Mill	619.381
Production Operator	222.683
Levers-Lace-Machine Operator	683.782
Rewinder Operator	640.885
Soapery Pumper	914.885
Mailing-Machine Operator	234.782
Data Processing Technician	213.885
[b]Multilith Operator	207.782

Table 27 (continued)

Macro Cluster 6: Occupations in Applied Physical Science and Technology

Cluster 39

Production Engineer	010.168
Naval Architect	001.881
Manufacturing Engineer	008.081
Nuclear Engineer	015.081
(Photomask) Engineer	019.081
Mechanical Engineering Assistant, Steam Plants	007.181
Engineering Aide II	019.281
Mechanical Engineer II	007.081
Automotive Engineer	007.081
Factory-Special Assignments Man; Modernization and Development Liaison Man	012.168
Maintainability Design Engineer	002.181
Assistant Chief Engineer	007.081
Civil Engineering Draftsman	017.281
Tool Designer	007.081
Thermodynamics Engineer	002.081
Maintenance and Construction Superintendent	189.138
Tool Programmer, Numerical Control	007.187
Draftsman, Detail	017.281
Production Engineer	012.188
Draftsman, Mechanical	001.281
Chief Engineer	005.168
Building Designer	001.081
Forest Engineer	013.131
Human Factors Specialist	045.088
Industrial Engineer Supervisor	012.188
Cost Analysis Engineer	002.187
Designer, Electromechanical	017.281

Cluster 40

Lead Civil Engineering Draftsman	005.281
Systems Layout Man	017.281
Field Engineer	957.288
Engineering Draftsman A and B	002.281
Surveying Technician	018.288

Electrical Engineering and Related Occupations

Cluster 41

Electronic Engineer	003.081
Electrical Engineer	003.081
Electrical Engineering Associate	003.187
Manager, Systems Planning and Program Development	020.018

Table 27 (continued)

Physicist	023.081
Superintendent, Tests	184.168
Aircraft Mechanic (Electrical)	801.381
Instrumentation Research and Development Technician	003.181

Managers and Operators of Production Operations/Systems

Cluster 42

Communications Electrician Foreman	184.168
Superintendent, Maintenance	189.168
Foreman, Production Department	621.131
General Foreman	183.168
Manager, Industrial Organization	189.118
[a] Teacher, Industrial Arts	091.228

Cluster 43

Finish Inspector-Instructor	774.384
Glass Blower, Laboratory Apparatus	772.281
[b] Plasterer	842.781
Yard Superintendent	809.131
Foreman	869.134
Patternmaker, Plaster	777.381
Foreman, Plating and Point Assembly	733.130
Director, Quality Control	012.168
Factory Supervisor	723.132
Inspector, Fabrication	807.381
[b] Casing Inspector	715.687

Chemists, Pharmacists, and Related Occupations

Cluster 44

Chemist, Organic	022.081
Textile Chemist	022.281
Lab Technician, Microbiology	041.281
Pharmacist	074.181
Formulator	022.081
Chief Pharmacist	074.118
Finish Mixer	550.884
Wood Technologist	040.081
Chemical Laboratory Technician	029.381
Pilot-Control Operator	559.782
Technician	029.381
Assistant Laboratory Technician	022.381
Chemical Operator III	559.782
Biochemist	041.081

Table 27 (continued)

Miscellaneous Occupations in Applied Physical Science and Technology	
Cluster 45	
Instructor, Computer Operations	097.228
Instructor, Technical	097.228
Cluster 46	
Bio-Instrumentation Technician	078.368
Special Procedure Radiologic Technologist	078.268
Cluster 47	
[b]Commissioner, Public Utilities	188.118
Polymerization Foreman	559.130
Operations Manager	187.168
Test Laboratory Supervisor	199.131
Gas Appliance Serviceman	637.281
Refrigeration and Heating Mechanic	637.351
Cluster 48	
Spectroscopist	011.281
Cloth Finisher I	589.137
Cluster 49	
Metallurgical Technician	011.181
Cluster 50	
Quality Control Worker	529.387
Biologist	041.081
Industrial Waste Inspector	168.287
Cluster 51	
Quality Control Pharmacist	168.168
Public Health Sanitarian	168.281
Roadmaster	182.168

Macro Cluster 7: Occupations in Electronic/Electrical Equipment/Systems Operation[c]

Macro Cluster 8: Farming, Forestry, and Other Botanically Related Occupations[c]

Table 27 (continued)

Macro Cluster 9: Health-Related Occupations

Medical/Health Nurses, Technicians, and Assistants

Cluster 52

Nurse, General Duty	075.378
Nurse, Licensed Practical	079.378
Medicine Aide	355.371
Dental Hygienist	078.368
Industrial Nurse	075.378
Radiation-Therapy Radiologist	070.108
Plant Nurse	354.368
Nurse Aide	355.878
Psychiatric Aide	355.878
Psychiatric Technician	079.368
Medical Laboratory Assistant	078.381
Medical Assistant	079.368
Surgical Technician	079.378
Physical Therapy Assistant	355.875

Medical/Health Doctors and Technologists

Cluster 53

Psychiatrist	070.108
Rehabilitation Counselor	045.108
Osteopath	071.108
Obstetrical Consultant	070.108
General Practitioner	070.108
Veterinarian	073.108
Physical Therapist	079.178
Supervisor, Technical Services	078.168
Medical Technologist	078.381
Chief Laboratory Technologist	078.168
Radiologic Technologist	078.368

Miscellaneous Health-Related Occupations

Cluster 54

Superintendent, Home for Aged	187.118
Supervisor of Nursing Care	075.128

Cluster 55

Biological Tester	041.281

Cluster 56

Dentist	072.108

Table 27 (continued)

Cluster 57	
Cottage Parent	355.878
Homemaker	309.878
Camp Counselor	159.228
Cluster 58	
Occupational Therapist	079.128
Art Therapist	079.128
Athletic Coach	099.288
Director, Camp	195.168
Hostess Home-for-Aged	329.168
Waterfront Coordinator	159.228
Rehabilitation Teacher of the Visually Impaired	094.208
Occupational Therapy Aide	079.368
Instructor	359.368
[b] Teacher, Physical Education	153.228
[b] Manager of External Security	372.138
Home Management Aide	096.228

Macro Cluster 10: Personal Service Occupations

Food and Beverage Service Occupations

Cluster 59	
Bakery Sales Clerk	290.478
Tray-Line Worker	355.878
Waitress II	311.878
Dining Room Attendant, Hospital	319.467
Coffee-Cart Man	290.878
Bartender	312.878
Manager, Juice Bar	311.867
[a] Checker, Fitting Room	299.868
[a] Wharf Attendant	342.867

Miscellaneous Personal Service Occupations

Cluster 60	
Reducing Machine Operator	339.878
Skycap	357.878
Locker-Room Attendant	335.878
Haircutter	332.271
Hair Colorist	332.271
Waiter, Head	311.138
Hostess, Restaurant or Coffee Shop	310.868
Doorman II	324.878
Gateman	372.868

Table 27 (continued)

Railroad Ride Operator	342.863
Monorail Operator	342.863
Cluster 61	
Hair Stylist	332.271
Cosmetologist	332.271
Barber	330.371
Make-Up Specialist	332.361
Manicurist and Facial Operator	332.361
Cluster 62	
[b]Routeman, Wholesale Ice Cream Products	292.358
[b]Salesman, Leather Products	264.358
[b]Fieldman	298.387
[b]Routeman, Film	292.483
Skate-Shop Man	299.864

Macro Cluster 11: Occupations in the Performing Arts[c]

Macro Cluster 12: Occupations in Visual Aesthetics[c]

Macro Cluster 13: Occupations in Animal Care[c]

Macro Cluster 14: Occupations in Assembly and Fabrication

Occupations in the Assembly and Fabrication of Various Products

Cluster 63	
Assembler, Metal Furniture	739.884
Assembler, Metal Furniture	739.884
Vending Machine Assembler	706.884
Stone Setter	735.887
Assembler	716.884
Heavy Assembler	721.884
Gas-Pump-Computer Assembler	710.884
Frame Maker	763.884
Engine Assembler	806.884
Fishing Rod Assembler	732.884
Cementer, Hand	788.887
Box Machine Operator	641.885
Rotary-Driller Helper	930.884
Module Assembler	726.887
Assembler, Small Products	739.887

Table 27 (continued)

Assembler, Accessories	729.887
Assembler, Dental Equipment	712.887
Gluer II	739.887
Case Coverer	739.884
Bracket Mounter	732.884
Upholsterer II	780.884
Furniture Upholsterer	780.381
Instrument Assembler	710.884
Assembler, Suspension Component "A"	716.781
Fireworks Assembler	737.887
Venetian Blind Assembler	739.884
Hose Maker	752.781
Grid Operator	725.884
Mounter I	726.887
Power Lawn Mower Assembler	706.884
Outboard Motor Assembler	806.781
Gasoline-Engine Assembler	806.781
Assembler	826.884
Assembly-Press Operator	690.885
Tire Mounter	750.887
Wrapper	920.687
Assembler V	731.885
Stapling-Machine Operator	692.885
Can Solderer	814.884
Welder, Production Line	810.884
Filling-Machine Operator	920.885
Garment Folder	789.887

Occupations in the Assembly and Fabrication of Textile Products

Cluster 64

Sewing Machine Operator, Regular Equipment	786.782
Fancy Stitcher	690.782
Transfer Knitter	684.782
Looper	689.782
Taper Top Line of Quarters	788.887
Binder II	787.782
Brim-Welt-Sewing-Machine Operator	787.782
Upholsterer	799.381
Stitcher, Special Machine	690.782
Gloves Sewer	787.782
Hosiery Looper	689.782
Seamstress	782.884
Hat Trimmer	784.884
Battery Loader	683.886
Burler	689.684
Edger	787.782
Weaver, Narrow Fabrics	683.782

Table 27 (continued)

Bag Machine Operator	649.885
Seamstress, Women's Garment Alterations	785.381
Cluster 65	
Inspector-Packer	769.687
Sample Maker, Button Cords	299.884
Emergency Equipment Repairman	759.384
Tailor II	725.281
Cushion Man	780.884
Fitter	365.781
Senior Carpet Mechanic	229.381
Cluster 66	
Hosiery Mender	782.884
Battery Assembler (Textiles)	727.887

Macro Cluster 15: Structural Work Occupations

Carpentry

Cluster 67

Patternmaker, Wood	661.281
Lip-and-Gate Builder and Oiler Maintenance Man	861.381
Cabinet Maker	660.280
Carpenter Helper, Maintenance	860.887
Maintenance Carpenter	860.281
Carpenter	860.381
Carpenter, Floor Rolling	864.781
Carpenter-Floor Rolling	864.781
[a]Automobile Body Repairman	807.381
[a]Furniture, Upholsterer	780.381
Bench Carpenter	760.884

Structural Construction and Repair Occupations

Cluster 68

Sheet-Metal Worker	804.281
Metal, Fabricator I	619.380
Tube Finisher and Assembler "A"	709.884
Shipfitter	806.381
Millwright	638.281
Model Maker I	693.381

Table 27 (continued)

Cluster 69	
Welder	819.381
Ornamental Iron Worker	809.381
[b]Instrument Adjuster	716.884
Reed Man	628.884
Pipe-Fitter, Maintenance	862.381
Dental Laboratory Technician	712.381
Welder, Arc	810.884
Welder, Combination	812.884
Grinder-Chipper I	705.884
Cluster 70	
Bricklayer Helper	861.381
Bricklayer	861.381
Ceiling Man	842.884
Foundry Worker, General	519.887

Macro Cluster 16: Mechanics and Stationary Machine/Equipment Repairers and Operators

Mechanics and Machinists

Cluster 71	
Air-Conditioning Installer, General	806.781
Pipe Fitter, Maintenance	862.381
Boilermaker I	805.281
Aircraft Mechanic, Rigging and Controls	801.381
Loom Fixer	683.280
Knitting Machine Fixer	689.280
Millwright	638.281
Honing Machine Set-Up Operator, Tool	603.782
Maintenance Mechanic, Wire Department	692.280
Turret-Lathe-Set-Up Operator, Tool	604.280
Boring-Mill Set-Up Operator, Horizontal	606.280
Tool-and-Die Maker	601.280
Machinist I	600.280
Boat Mechanic	623.281
Diesel Mechanic	625.281
Automobile Mechanic	620.281
Automobile Service Station Mechanic	620.381
Vending-Machine Repairman	639.381
Farm Equipment Mechanic I	624.281
Welder, Gas Shielded Arc	810.884
Soft-Water Serviceman	862.884
Diesel Mechanic	625.281

Table 27 (continued)

Cluster 72	
Powder-Line Repairman	629.281
Refrigeration Mechanic	637.281
Sewing-Machine Repairman	639.281
[b] Inspector, Finished Goods	724.884
Mine Machinery Mechanic	620.281
Foundrinier-Machine Tender	539.782
Aircraft and Engine Mechanic	621.281
Electrical Appliance Serviceman	827.281
Balancing-Machine Operator	609.782
Maintenance Man, Building	899.381
Miscellaneous Stationary Machine/Equipment Operators	
Cluster 73	
Web Press Man	651.782
Packaging Machine Mechanic	920.280
Printer-Slotter Operator	651.782
[b] Cargo Agent	912.368
Knitting Machine Operator	685.885
Armoring Machine Operator	691.885
Hairspring Vibrator	715.381
Pairing Machine Operator	691.782
Cable Maker	726.884
Cluster 74	
Precision Lens Grinder	675.380
Extruding Machine Operator	691.782
Bag Machine Adjuster	649.780
Transferer I	972.381
Scale Mechanic	633.281
Marker II	920.887
Machine Set-Up Operator	600.380
Grinder Set-Up Operator, External	603.782
Fabricator A-Cutting Department	619.380
Sawman	677.782
Cluster 75	
Centrifuge Operator	521.885
Ice Maker	523.885
Drawing-Frame Tender	680.885
Carding Machine Operator	681.885
Foundrinier-Machine Tender	539.782
Ammonium-Nitrate Crystallizer	553.885
Tubemill Operator	570.885
Production-Machine Operator	609.885
Gang Sawyer	667.782

Table 27 (continued)

Panelboard Operator	939.782
Pressman	611.782
Punch-Press Operator I	615.782
Manipulator	613.782
Punch-Press Operator	615.782
Stereotyper	975.782
Broaching Machine Set-Up Operator	605.782
Woodworking Machine Operator	669.782
Photographer, Finish	143.382
Offset-Duplicating Machine Operator	207.782

Stationary Forming Machine/Equipment Operators

Cluster 76

Compression-Molding Machine Tender	556.885
Ring Stamper	700.884
Extruder Operator	557.782
Compressor	556.782
Record-Press Tender	556.885
Blown Plastic Container Machine Operator	556.885
Forming-Machine Upkeep Man	575.380
Wire Drawer	614.782
Welder, Pipe-Making	616.380
Firesetter	692.380
Furnace Operator	512.782
Die-Casting-Machine Operator	514.885

Textile Machine/Equipment Operators

Cluster 77

Hemmer	787.782
Weaver	683.782
Stitcher, Standard Machine	690.782
Circular Knitter	685.885

Processing System/Plant Operators

Cluster 78

Stillman	542.280
Water Treatment Plant Operator	954.782
Propellant-and-Gas Mechanic	630.781
Crew Leader-Power House	952.262
Production Foreman	939.131
Stationary Engineer	950.782
Offset Web Press Man	651.782
Maintenance Superintendent	189.131

Table 27 (continued)

Cluster 79	
Screw Machine Set-Up Operator, Jobbing	604.380
Envelope-Machine Set-Up Man	641.780
Miscellaneous Mechanical-Related Occupations	
Cluster 80	
Maintenance Mechanic II	638.281
Substation Operator	952.782
Customer-Engineering Specialist	828.281
Laboratory Technician	019.281
Precision Assembly Mechanic	706.381
Inspector, Assemblies and Installations	806.381
Cluster 81	
Flexographic Pressman I	651.782
V-Belt Wrapper	690.885
Edge Shaper	788.885
Mounter, Color Film	976.885
Spar Mechanic	709.281
Machinery Erector	638.281
Pipe Layer	851.884
Production Mechanic, Tin Cans	619.380
Rigger	431.263
Macro Cluster 17: Occupations in Stationary Machine/ Equipment Tending, Feeding, and Offbearing[c]	
Macro Cluster 18: Routine Object/Material Handling and Cleaning Occupations[c]	
Macro Cluster 19: Occupations in Mechanized Equipment and Vehicle Operation	
Mechanized Equipment Operators	
Cluster 82	
Fork-Lift Truck Operator	921.883
Log Stacker Operator	942.883
Locomotive Crane Operator	921.883
[a]Chauffeur	913.883
Power-Shovel Operator	779.883
Operating Engineer II	859.883
Scraper Operator	850.883
Sand-Slinger Operator	518.883

Table 27 (continued)

Feeder	419.883
Gasoline Truck Operator	922.883
Farm Hand	404.883
Tractor Driver	401.883
Cranberry Farm Hand	404.883
Farm Hand, General	421.883

Vehicle Operators

Cluster 83

Messenger	230.878
[b] Salesman, Driver	292.358
[b] Security Inspector	372.388
[b] Fire Fighter	373.884
[b] Weigh-Out Man	224.487
Salesman-Driver, Laundry	292.358
Delivery Man	299.873
Routeman	919.883
Truck Driver	909.883
Route Supervisor, Laundry	292.138
Chauffeur	359.873
[a] Combine Operator	401.883
[b] Water Serviceman	168.284

Macro Cluster 20: Electricians, Electronic Technicians, and Related Occupations

Electricians and Electronic Technicians

Cluster 84

Electrician A	828.281
Television Service and Repairman	720.281
Playback Operator	939.782
Electrician	824.281
Radio Mechanic	823.281
Electronic Technician	003.181
Inspector, Subassemblies (Electronics)	726.384
Electronics Mechanic	828.281
Maintenance Man, Factory or Mill	714.281
Patrolman (light, heat, and power)	959.387
Senior Communications Electrician	822.131
Foreman, Electrical Assemblies	126.130
Chief Test Engineer	003.021

Table 27 (continued)

Occupations in Assembly and Repair of Electrical/ Electronic Components and Devices

Cluster 85

Solderer	710.884
Electrical Control Assembler	729.884
Electric Motor Assembler	721.884
Electronics Assembler	726.781
Assembler, Microwave Tube	725.884
Electronic-Sensing-Equipment Assembler	716.884
Semiconductor Assembler	726.884
[a]Aircraft Mechanic, Electrical	825.281
Lineman, Repair	821.381

Macro Cluster 21: Occupations in Food Processing/Preparation

Food Processing Laborers and Kitchen Workers

Cluster 86

Meat Cutter	316.884
Fish Cleaner	525.884
Preparation Man	316.884
Celophane Wrapper, Hand	920.887
Leadman	522.887
Mixer, Dry-Food Products	520.885
Egg-Breaking Machine Operator	521.885
Seasoning Mixer	520.887
Warehouseman	922.487
Laborer, Bakery	524.381
Bread Girl	317.884
Cook Helper	313.883
Housekeeper	306.878
[a]Dietary Aide II	355.884

Food Preparation Specialists and Managers

Cluster 87

Baker	313.781
Domestic Cook	305.281
Cook	313.381
Short Order Cook	314.381
Food Service Worker II	317.381
Butcher, Head	316.781
Modified Diet Cook	313.381

Table 27 (continued)

Chef	313.131
School Lunch Supervisor	313.131
Satellite-Manager	313.467
Dairy Processing Equipment Operator	519.782
Baker	526.781
Pastry Chef	313.131
Miscellaneous Occupations in Food Preparation	
Cluster 88	
[a]Kitchen Supervisor	319.134
[a]School Food Service Coordinator	313.131
Cook-Server	315.381
Head Salad Girl	317.138
Foreman, Cattle (Feed prep.)	413.138

[a]This job was judged to belong within this macro cluster but not within this particular micro cluster.

[b]This job was judged as not belonging in this macro cluster.

[c]There were no micro clusters identified for this macro cluster. See Appendix D for the list of jobs subsumed by this macro cluster.

APPENDIX I

RELATIONSHIPS AMONG PRODUCTS AND WORK UNITS IN AN INDIVIDUALIZED VOCATIONAL INFORMATION SYSTEM

Excerpt from Cunningham, J. W. The development of a research-based individualized vocational information system for use in guidance. Proposal submitted to the U. S. Office of Education. Raleigh: North Carolina State University, Center for Occupational Education, November, 1974.

RESULTS

As noted earlier, the project objectives and plans call for the development of an Individualized Vocational Information System for use in guidance in grades 8 through 11. The completed IVI System would provide the student with vocational information related to his/her particular interests as measured by the Vocational Activity Preference Profile (VAPP). The system would provide the student with information on a broad, general (cluster) basis or at a focused, detailed level, depending upon his/her needs and stage of vocational development. (Most students would enter the system at the cluster level and later narrow their search to specific occupations and jobs.) It would provide LEA's with a systematic procedure for analyzing jobs, occupations, and vocational/technical (and other occupational) programs of special interest, for the purpose of incorporating them into the system; it would also provide LEA's with a framework for organizing their particular sources of information (booklets, catalogs, files, brochures), thereby incorporating them into the system. Moreover, because the major components of the IVI System are not specific to particular localities or regions and because it is designed to be incorporated into a variety of guidance programs, the completed system should be easily transportable to different LEA's; it would have nationwide applicability. Although the completed IVI System would be directed toward grades 8-11, it could later be expanded to grade levels above or below this range.

Figure 1 depicts the relationships among the work units and final products in the proposed project. The specific products are summarized below. (Complete descriptions of the products were presented in the preceding Plan section.)

(a) Occupational Cluster Structure. The completed occupational cluster structure will consist of groups of occupations with similar work-dimension profiles. It is anticipated that there will be a set of approximately 25-30 broad (macro) clusters which, in turn, will subsume varying numbers of more specific (micro) clusters (perhaps a total of 90 to 100). The resultant cluster structure will be linked to the 15 Office of Education categories and the 22 work areas and 114 worker trait groups of the U. S. Employment Service. (The micro clusters will probably be subsumed under the broad OE and USES categories and will probably be directly related to at least some of the worker trait groups.) The cluster system will incorporate the occupational titles (and descriptions) in the Occupational Outlook Handbook and Encyclopedia of Careers and will include representative samples of the titles and descriptions in the Dictionary of Occupational Titles (DOT). Work-dimension and attribute-requirement profiles will be derived for the occupations and clusters in the system. (This includes the original 1400 occupations and the clusters based on them, but not all of the occupations in the Handbook, Encyclopedia, and DOT.)

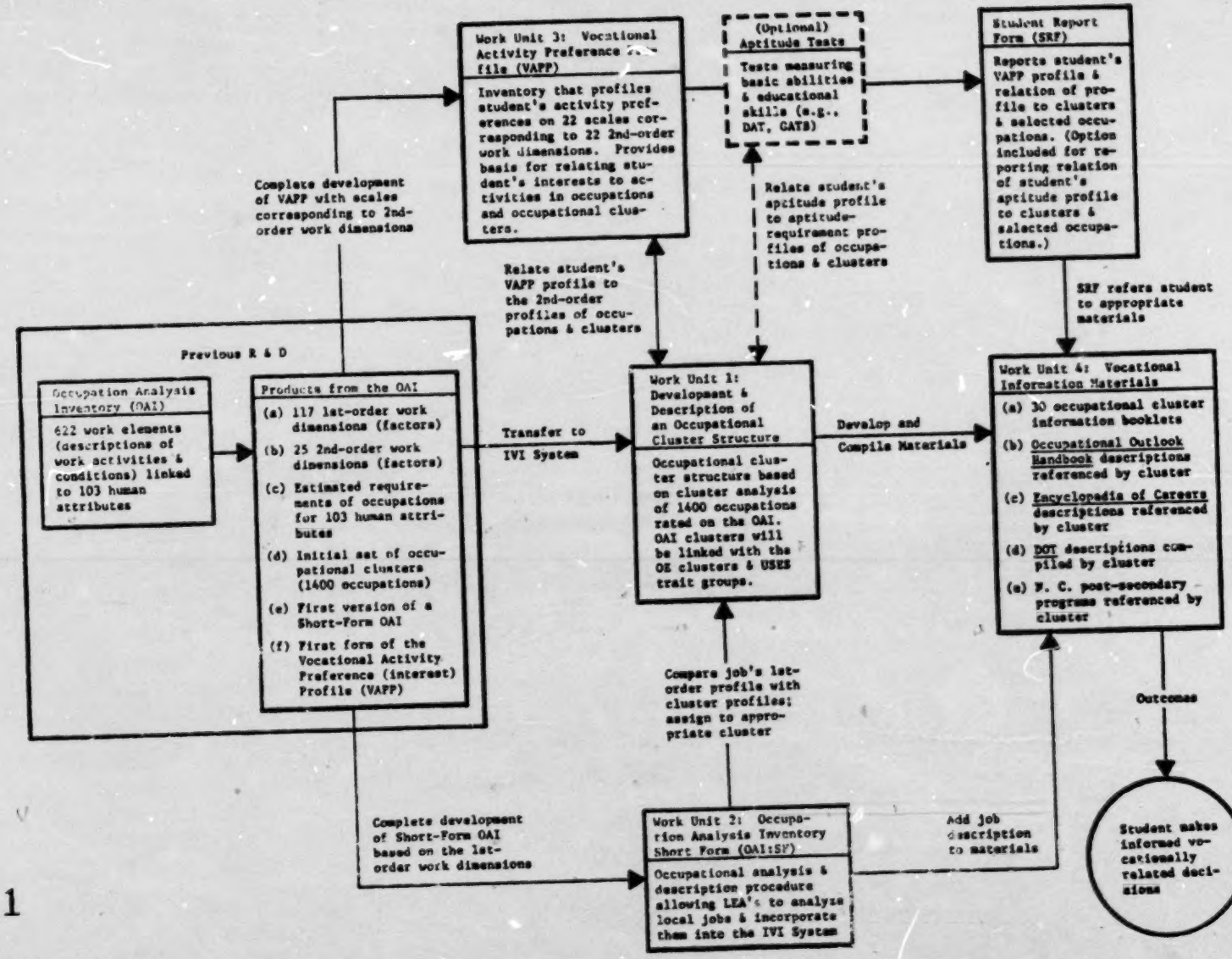
Work Unit 3: Vocational Activity Preference Profile (VAPP)
Inventory that profiles student's activity preferences on 22 scales corresponding to 22 2nd-order work dimensions. Provides basis for relating student's interests to activities in occupations and occupational clusters.
(Optional) Aptitude Tests
Tests measuring basic abilities & educational skills (e.g., DAT, GATB)
Student Report Form (SRF)
Reports student's VAPP profile & relation of profile to clusters & selected occupations. (Option included for reporting relation of student's aptitude profile to clusters & selected occupations.)
Complete development of VAPP with scales corresponding to 2nd-order work dimensions
Relate student's VAPP profile to the 2nd-order profiles of occupations & clusters
Relate student's aptitude profile to aptitude-requirement profiles of occupations & clusters
SRF refers student to appropriate materials
Previous R & D
Occupation Analysis Inventory (OAI)
622 work elements (descriptions of work activities & conditions) linked to 103 human attributes
Products from the OAI
(a) 117 1st-order work dimensions (factors)
(b) 25 2nd-order work dimensions (factors)
(c) Estimated requirements of occupations for 103 human attributes
(d) Initial set of occupational clusters (1400 occupations)
(e) First version of a Short-Form OAI
(f) First form of the Vocational Activity Preference (interest) Profile (VAPP)
Transfer to IVI System
Work Unit 1: Development & Description of an Occupational Cluster Structure
Occupational cluster structure based on cluster analysis of 1400 occupations rated on the OAI. OAI clusters will be linked with the OE clusters & USES trait groups.
Develop and Compile Materials
Work Unit 4: Vocational Information Materials
(a) 30 occupational cluster information booklets
(b) Occupational Outlook Handbook descriptions referenced by cluster
(c) Encyclopedia of Careers descriptions referenced by cluster
(d) DOT descriptions compiled by cluster
(e) N. C. post-secondary programs referenced by cluster
Compare job's 1st-order profile with cluster profiles; assign to appropriate cluster
Outcomes
Complete development of Short-Form OAI based on the 1st-order work dimensions
Work Unit 2: Occupation Analysis Inventory Short Form (OAI:SF)
Occupational analysis & description procedure allowing LEA's to analyze local jobs & incorporate them into the IVI System
Add job description to materials
Student makes informed vocationally related decisions

Figure 1
Relationships Among Products and Work Units in the IVI (Individualized Vocational Information) System

(b) The Vocational Activity Preference Profile (VAPP). The VAPP will measure the student's activity preferences on 22 scales corresponding to the second-order OAI work dimensions (factors). This instrument, containing approximately 250 items, will provide a basis for relating a student's vocational interests to the characteristics of various occupations and clusters in the IVI System. Students will be referred to appropriate vocational information materials on the basis of these relationships.

(c) Short Form of the Occupation Analysis Inventory (OAI-SF). The OAI-SF will contain approximately 220 "work elements" on which jobs, occupations, and vocational/technical programs can be analyzed (i.e., rated). Computer processing of the OAI-SF ratings will yield a work-dimension and attribute-requirement profile for the job in question, as well as a cluster assignment. The results will be presented on a computerized report form and returned to the user. Based on these results, jobs, occupations, and programs of special interest to an LEA can be incorporated into the IVI System. (The OAI-SF might also be developed for use in comparative analyses among vocational/technical education programs and between programs and occupations.)

(d) Vocational Information Materials. Approximately 30 occupational cluster information booklets will be developed describing, in interesting and digestible form, the activities, requirements, and conditions associated with occupations in particular clusters. A cluster booklet will also list occupations associated with the cluster in question and reference appropriate occupational descriptions and page numbers in the Occupational Outlook Handbook and Encyclopedia of Careers. Suggestions will be offered on how the student can learn more about the occupations in a particular cluster. In addition, a file will be constructed containing a representative sample of DOT descriptions for each occupational cluster, and a list of postsecondary educational programs in the State of North Carolina will be compiled for each cluster. By assigning their specific sources of vocational information (booklets, films, brochures, catalogs) to the appropriate clusters, LEA's will be able to incorporate these materials into the IVI System.

(e) Student Report Form (SRF). The SRF will present the student's VAPP scale profile along with estimates of correspondence between his/her profile and the work-dimension profiles of the various occupational clusters in the IVI structure. (A provision may also be included for presenting estimates of correspondence between the student's VAPP profile and the profiles of a few specific occupations selected by the student.) Based on these correspondence estimates, the SRF will suggest what cluster booklets the student might be interested in reading. An optional SRF will be developed which will also include estimates of correspondence between the student's aptitude test profile and the aptitude requirements associated with the various occupational clusters.

(f) Counselor/Teacher's Handbook and User's Manual. The Counselor/Teacher's Handbook will contain a summary description of the IVI

System and how it was developed (in laymen's terms). The cluster structure and all of the related instruments and materials will be described. The User's Manual will describe how to administer the VAPP, interpret the Student Report Form, and refer the student to appropriate vocational materials. Complete descriptions of all VAPP scales will be included. Suggestions will be offered on how to help the student get the most from the vocational information materials in the IVI System.

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